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SUMMARY OF RECENT ABSTRACTS *

I. CHOLERA †

General

In the seventh of his exhaustive surveys of the literature relating to cholera POLLITZER (p. 34) deals with practical laboratory diagnosis under such headings as preservation, cultivation, isolation from water, agglutination and other tests. In his section on clinical pathology (p. 1077) he discusses loss of fluid and salts, changes in the blood, circulatory failure, renal failure and uraemia. The section on symptomatology, diagnosis, prognosis and treatment (p. 1187) deals equally fully with subjects essential to the clinician. These chapters, and eventually the monograph as a whole, provide detailed information which will be essential reading for those who study the disease or are called upon to deal with it.

Aetiology

FINKELSTEIN and LANKFORD (p. 1077) report that a bacteriotoxic factor is formed in a simple chemically defined culture medium when glucose and phosphate are present during heat sterilization. This factor contains carbonyl compounds on which the inhibitory activity appears to depend, and it inhibits not only *Vibrio cholerae* but also certain other Gram-negative organisms. BHASKARAN and ROWLEY (p. 33) show that half of the strains of *V. cholerae* examined by them were able to grow on a simple inorganic medium with ammonium ions as the sole source of nitrogen; the others required purines, and these could grow on inorganic media containing human, rabbit or goat serum, but not mouse, rat, guineapig or horse serum.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1957, v. 54. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on cholera in this series, see the January issues of the *Tropical Diseases Bulletin* each year since 1939.

FELSENFELD and ROKKAKU (p. 680) show that with artificially infected water the membrane filter technique was more effective than growth in peptone broth followed by plating, in isolating *V. cholerae*, especially in samples containing very few organisms.

BHASKARAN and GORRILL (p. 1315) grew *V. cholerae* in the presence of monospecific antiserum (Ogawa or Inaba), and they found that when Ogawa strains were exposed to Ogawa antiserum, Inaba mutants could be recovered to the extent of about 1 in 10^5. Growth of Inaba strains in Inaba serum did not reveal any mutants of Ogawa type. The variations observed are held to be spontaneous mutations.

The amino-acid composition of *V. cholerae* cells is described by BANERJEE *et al.* (p. 424).

ARORA *et al.* (p. 681) found that when the growth medium for *V. cholerae* was supplemented by NaCl the enzyme activities of the cells were considerably increased.

It has been suggested that the mucinase of *V. cholerae* may be involved in pathogenesis, and that immunization against this mucinase might be useful, but hitherto the mucinase has been found unstable. LOWENTHAL (p. 287) has now prepared a stable purified mucinase, and experiments indicate that a cholera vaccine in which this is incorporated might have certain advantages over the vaccine without mucinase.

HUSAIN and BURROWS (p. 426) attempted to correlate virulence of *V. cholerae* for man (as evidenced by the course of the disease for the different strains) with virulence for mice after intraperitoneal injection, but were unable to find any relationship. An investigation of bacteraemia in infected mice, however, indicated that strains isolated from patients who died from cholera are more invasive in the mouse than strains from non-fatal cases.

GALLUT (p. 1411) failed to enhance the toxicity of *V. cholerae* by passing it by intestinal infection through rabbits. FRETER (p. 681) separated two toxic fractions (acid-soluble and acid-insoluble) from *V. cholerae*; they were stable to heat but lost toxic activity within a few days at *p*H 7·0 in the refrigerator. He suggests that the acid-insoluble toxin may represent the acid-soluble toxin bound firmly to a protein component which determines solubility.

By administering erythromycin and streptomycin intragastrically to mice and guineapigs (to inhibit the normal flora) and then giving streptomycin-resistant strains of *V. cholerae* or *Shigella flexneri* by mouth, FRETER (p. 38) was able to establish non-fatal but persistent infections. The antagonistic action of the normal flora seems to be the chief reason for the inability of *Shigella* and *Vibrio* strains to establish themselves in the gut. By a modification of this technique the same author (p. 38) produced rapidly fatal infections in fasting guineapigs, but intragastric administration of O antibody with $CaCO_3$ before the infecting dose prevented infection if the antibody was present in the lumen of the gut, which suggests that copro-antibody is an important defence mechanism.

V. cholerae is very susceptible to drying, but SHAW (p. 425) shows that the viable count on reconstituted dried material is higher if blood is used in the media. Blood seems to provide an essential factor for recovery, which serum fails to supply.

BHASKARAN (p. 1314) found that *V. cholerae* is rapidly lysed by thymol, apparently in the strength at which thymol is soluble (1 in 1500). This may prove useful in studies on the organism.

GUPTA *et al.* (p. 425) isolated strains of vibrios from patients with gastro-enteritis during an outbreak, and from river water, but none belonged to the classical cholera group. Nevertheless, experiments indicated that some strains were pathogenic for rabbits, and the authors think that they might produce clinical cholera in man.

Treatment: Immunization

BANERJEE *et al.* (p. 1189) found raised blood sugar in a majority of cholera patients, which did not seem to be merely a reflection of the state of dehydration. They gave glucose intravenously to these patients and observed that the increased blood level resulting from this soon returned to normal, indicating that glucose can be used satisfactorily in cholera. They speculate on the mechanism of hyperglycaemia in this disease.

In cholera the glomerular filtration rate and the renal plasma flow are diminished. BANERJEE and GHOSH (p. 953) suggest that this may be due to renal anoxia causing temporary diminution of blood flow through the cortex of the kidney, not to any specific toxins of the disease.

In an epidemic of cholera in Calcutta CHATTERJEE (p. 568) was often able to counteract dehydration by oral and rectal administration of fluid if the specific gravity of the blood was below 1064; to reduce vomiting he gave Avomine, and to reduce diarrhoea he gave the juice of *Coleus aromaticus*. For severe shock the routine treatment was "intravenous or parenteral" saline. In view of the renal failure which occurs in cholera he (pp. 817, 1411) used the antihistamine drug promethazine, with vitamin C, in a large number of patients with cholera in Calcutta, and the death rate in these patients was much below that obtaining generally in Calcutta.

Nitrogen is present in gastric secretions, and is secreted after the injection of histamine; the amount is higher in patients convalescent from cholera than in normal persons. On the basis of these observations LAHIRI *et al.* (p. 817) used gastric lavage with large quantities of 10% cane sugar solution for the treatment of uraemia in cholera.

BANERJI (p. 428) used plasma successfully in cases of cholera shock which failed to respond to saline. An isotonic colloidal solution of polyvidone was also useful in moderately severe cases, but not in severe collapsed patients who had been in that condition for some time; plasma was better for such patients. BASU (p. 568) used a 3·5% solution of

polyvidone with electrolytes comparable with those in plasma. Some of the patients responded but others did not, and the author suggests that without this treatment most of them would have died. There were no controls, but the author's clinical impression on the whole was favourable.

LAHIRI and GUHA (p. 567) found that certain synthetic compounds inhibited the growth of *V. cholerae* in high dilution, but in clinical trials did not appear to influence clinical cholera favourably.

CHATTERJEE (p. 1315) has used extracts of two Indian plants to control haemorrhage in cholera, and reports some beneficial action.

HUSAIN (p. 569) notes that the incorporation of calcium stearate into cholera vaccine materially enhances the agglutination titre of animals injected. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

KRAAN, H. **Import of Malaria in the Netherlands.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 269–72, 2 graphs.

In 1952, the autochthonous strain of *Plasmodium vivax* was believed to have been eradicated from the endemic area in North Holland, but a number of cases of local origin occur every year. A few were caused by *P. vivax* but, in 1955, most were due to *P. malariae*. This species had seldom been found in the epidemic of 1946–48. Many potential *Plasmodium* carriers have been repatriated since 1946, some of whom had a primary attack of malaria a few months after their arrival in the Netherlands; these cases could not be due to local infection, as the patients were still abroad during the home malaria season.

From 1948 the number of imported cases has exceeded that of the autochthonous cases. The number of healthy parasite carriers arriving from endemic areas may be considerable. A single blood examination in 14,283 healthy subjects revealed 437 parasite carriers, of whom 202 stated that they had never had an attack of fever. In another investigation [this *Bulletin*, 1939, v. 36, 90], of 264 healthy persons only 78 of whom had suffered from malaria in the year of examination, 103 were found to be carriers, 67 of whom had had no fever that year.

In order to prevent undesirable consequences of the introduction of parasite carriers, the following measures are now taken. Houses in which an imported case of malaria occurs are sprayed with DDT; when an autochthonous case of malaria is reported, the Malaria Commission tries

to establish the source of infection among the persons and houses in the vicinity; once yearly the blood is examined of immigrants from Indonesia who are put up in barrack camps, etc.; their living quarters are sprayed with DDT no matter whether the occupants are infected or not.

B. B. Waddy

BRUCE-CHWATT, L. J. **An Unusual Epidemiology of Malaria in South-Eastern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 411–18, 1 map. [24 refs.]

A malaria survey was carried out in August 1956 in the Enugu Ezike area of N'sukka Division in South-Eastern Nigeria. Spleen and parasite rates indicated that malaria is holoendemic in this area. *P. falciparum* is the dominant parasite, but *P. malariae* and *P. ovale* are also present in unusually high numbers.

The entomological findings were of unusual interest. The only anopheline species found in human dwellings was *A. gambiae*, which had density averaging 2·8 females per room-day, with a sporozoite rate of 3·6% in 28 dissected. The next most common mosquito frequenting houses was *Culex fatigans*.

Acute water shortage over the whole Division has resulted in the custom of storing water in large pots, holding 2 to 6 gallons, in the back yards of the houses. The mean frequency of breeding of *A. gambiae* in these pots in Enugu Ezike was 27%, practically every house having 4 or more pots containing 50 to 200 larvae in each. As the author points out, this adaptation of *A. gambiae* to meet local conditions is a striking example of its capacity for plastic behaviour and of its dependence on human activity.

The use of dieldrin larvicidal pellets is advocated as a control measure.

G. Covell

RAFI, S. M., RASHID, M. & SHOREY, W. U. **Malaria Survey of Border Area of Baluchistan adjacent to Iran.** *Pakistan J. of Health.* 1957, Jan., v. 6, No. 4, 233–42, 1 map.

A malaria survey of the border area of Baluchistan adjacent to Iran was undertaken in order to determine the malaria condition present and to recommend antimalarial measures. 31 villages were surveyed in an area consisting of a belt about 600 miles long by 10 broad stretching along the Iranian border. The belt can be divided into highland, plain and desert. The highland consists of the mountain ranges of Mekran, Kharan and Chagai, while the valley of the Dasht river in Mekran is plain. The climate generally shows a long hot summer and short mild winter. Rainfall is scanty, varying from 3 inches annually to 14 or 15 inches in southern areas, most of which falls in the summer.

Only 3 to 10% of the land is under cultivation. Population density varies from 2 to 6 persons per square mile; practically the whole of the rural population is agricultural or pastoral, and seasonal migration within and even outside the province is a feature determined by the conditions of soil and climate.

Village by village, the child (2 to 10 years) spleen rate varied from 0 to 57·7%, and the child parasite rate from 0 to 23·4%. The highest incidence of malaria was during the months of August to December each year, and among 7 species of *Anopheles* identified were the well known carriers *A. fluviatilis* and *A. culicifacies*.

The main control recommendations were a total spraying campaign annually before the rains and free treatment of cases by the field staff during the malaria season. Liaison with the Iranian authorities, who are conducting antimalarial measures on their side of the border, is suggested.

B. B. Waddy

FISCHER, L. & STEINHART, W. Malaria und Malariaüberträger in Sarobie (Afghanistan). [**Malaria and its Transmission in Sarobie, Afghanistan**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 69–83, 7 figs. [23 refs.]

The malaria season, as studied closely in the township and mountainous neighbourhood of Sarobie, in eastern Afghanistan, is seasonal from August to mid-November with a peak incidence in September and October. This is associated with transmission by *Anopheles superpictus* breeding mainly in the drying beds of river courses; limited breeding of this species is found in rice-fields, together with *A. stephensi* and *A. hyrcanus*. Neither of these species appears to be a vector. These conditions are considered to be typical for Afghanistan and neighbouring mountainous territory. Figures include maps and photographs of the Sarobie area and tables and charts of the incidence of malaria in relation to climatic features.

D. S. Bertram

D'ALESSANDRO, G., FRIZZI, G. & MARIANI, M. **Effect of DDT Selection Pressure on the Frequency of Chromosomal Structures in *Anopheles atroparvus*.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 4, 859–64.

GILLIES, M. T. **Age-Groups and the Biting Cycle in *Anopheles gambiae*. A Preliminary Investigation.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 553–9. [13 refs.]

A table gives the percentage of *Anopheles gambiae* biting and entering houses in 4-hour periods from 1800 hours to 0600 hours (6 p.m. to

6 a.m.), based on data from numerous workers. About 15–20% of the night's catch is taken before 10 p.m. and about 30 to 50% in each of the two later periods.

The author studied the percentages in each period of pre-gravid females (young and newly-emerged) and older gravid females with and without sporozoite infections entering experimental huts at Tengeni near the Tanganyika coast. No marked evidence was found of differences between young and older females in the time of their activity. The percentage of young females which had been fertilized did not vary much in the three periods. Infective females were caught in all three periods. Although finer time divisions may have indicated short-term variations related to age-groups, it is concluded that the main pattern of biting activity of *A. gambiae* through the night is not dependent upon the differential activity of the age-groups studied in these observations. [See also this *Bulletin*, 1954, v. 51, 1032.] *D. S. Bertram*

WATTAL, B. L. **Malaria Vectors of India. X.** *Anopheles jeyporiensis* **var.** *candidiensis* **Koidzumi, 1924.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1957, May, v. 5, No. 3, 177–90, 1 map. [Numerous refs.]

This paper, abstracting previous literature, gives an account of the distribution and biology of *Anopheles jeyporiensis* and its variety *candidiensis*. It is concluded that although over the years only oöcysts have been observed in dissections, the species (and variety) must, in view of their large numbers in highly malarious areas, be suspected as contributing to transmission of the disease. Care of irrigation drains, rice field drainage and the use of residual insecticides are named as control measures. *D. S. Bertram*

ALLISON, A. C. **Malaria in Carriers of the Sickle-Cell Trait and in Newborn Children.** *Exper. Parasit.* New York. 1957, July, v. 6, No. 4, 418–47. [Numerous refs.]

This is the most comprehensive review of the relationship between malaria and the sickle-cell trait yet written. There are more than 100 references. The discussion is extended to examine the possibility that infants might be protected against malaria by their foetal haemoglobin, and a particularly valuable section is devoted to the possible explanations for the limited growth of *P. falciparum* in the erythrocytes of sickle-cell trait carriers.

It is now accepted that sickle-cell trait carriers are as easily infected with *P. falciparum* as non-sicklers and that there is no difference in the incidence of parasitaemia. It is obvious that this effect of the sickle-cell trait on malaria is only of importance at an age at which immunity has

not yet been acquired. Non-immune sicklers, however, have lower parasite counts, which suggests that sickle-cell haemoglobin interferes with the multiplication of the trophozoites. As malarial mortality depends on the degree of parasitaemia, sicklers are therefore less likely to die from malaria than non-sicklers. This protection against malaria by the sickling trait may well account for the high incidence of sickling in some tropical regions. Whether the same explanation can be put forward for the high incidence of thalassaemia, haemoglobin C and haemoglobin E in some communities, has not yet been fully decided. [The indications in the literature are that this may be so in the case of thalassaemia but not in the case of haemoglobin C.] *H. Lehmann*

BASCOULERGUE, P. Hépatomégalie et paludisme chez l'enfant africain. [**Hepatomegaly and Malaria in African Children**] *Méd. Trop.* Marseilles. 1957, July–Aug., v. 17, No. 4, 554–8, 3 graphs.

Hepatomegaly was encountered in up to 50% of children examined systematically in French Equatorial Africa, primarily for research into protein deficiency. It was at first thought to be associated with kwashiorkor, but was found with equal frequency in the absence of other evidence of protein deficiency. Nor was it a sign of schistosomiasis, which is unknown in the region. The graphic curve of hepatomegaly faithfully followed those of splenomegaly and malarial parasitaemia, and it is concluded that malaria is the cause. This seems quite logical. Hyperplasia of the reticulo-endothelial system occurs in the building-up of malarial immunity, and the liver, besides the spleen, is rich in this tissue. The hyperplasia is accompanied by a corresponding augmentation of the gamma globulins in the serum. The enlarged livers, like the spleens, tend to disappear again in the adult, but probably they retain histological stigmata; there is evidence of a progressive increase in hepatic precollagen, cirrhosis in the adult being thus favoured.

[The paper, and especially the graphs, are convincing. Hepatomegaly as a sign of chronic malaria is familiar to tropical practitioners and pathologists, and has been mentioned for example by COLBOURNE *et al.* (this *Bulletin*, 1951, v. 48, 685) and MCGREGOR and SMITH (*ibid.*, 1953, v. 50, 57). Inexplicably, it receives no more than a passing reference in text-books, and therefore each worker writes of it as something new. More than 10,000 children were examined by the author of this paper, and his results deserve more than passing attention.] *B. B. Waddy*

SANDOVAL, A. M. Quimioterapia del paludismo. [**Therapy of Malaria**] *Medicina.* Mexico. 1957, July 10, v. 37, No. 775, 289–309, 1 diagram. [30 refs.]

A general review.

HARRIS, F. C. **Overdosage of Chloroquine.** [Correspondence.] *Brit. Med. J.* 1957, Oct. 19, 943.

In 1955 the author, from Ghana, described a fatal case of chloroquine overdosage in a child who had received more than the recommended dose of 5 mgm./kgm. by intramuscular injection [this *Bulletin*, 1955, v. 52, 871]. He now records 2 more cases in children aged 5 and 17 months respectively who died within 20 minutes of intramuscular injections amounting to 120 mgm. and 100 mgm. of chloroquine base. These quantities were respectively about 3 to 4 times and twice the correct dose by weight.

In the manufacturer's literature the dosage for children is stated in simple fractions of the adult dose. Figures are given to show that such calculations may result in some cases in an infant being given far too high a dose when this is estimated on a weight basis. As injections should be given only on qualified medical advice the pharmaceutical manufacturers should avoid the dangers of rule-of-thumb dosage. Any medical practitioner should be capable of calculating the correct dose by weight. "This is a good example of a first-class drug being brought into disrepute owing solely to its use in a haphazard fashion. It is hoped that the manufacturers will emphasize the danger of overdosage in the instructions accompanying this drug." *H. J. O'D. Burke-Gaffney*

DREY, R. E. A. **The Assay and Identification of Pyrimethamine and its Preparations.** *J. Pharmacy & Pharmacol.* London. 1957, Nov., v. 9, No. 11, 739–46, 1 fig. [12 refs.]

YOUNG, M. D. **Resistance of** *Plasmodium malariae* **to Pyrimethamine (Daraprim).** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 621–4, 2 figs.

It has been suggested that resistance to pyrimethamine is likely to develop only under conditions where inadequate dosage has been given. The author reports 6 instances in which resistance was observed after administration of a dosage 4 times greater than that recommended weekly for suppression. With 2 exceptions the patients were all Negroes.

Resistance appeared suddenly in a patient who was treated for the first time with pyrimethamine (50 mgm. daily for 2 days) during the third week of an induced primary attack of quartan malaria. The same dosage was subsequently repeated on 4 occasions at intervals of 7 to 14 days. On each occasion fever and parasitaemia were temporarily controlled, only to reappear a few days later. The strain was subinoculated to 5 other patients, in all of whom the parasite exhibited resistance, usually of a high order. The most resistant case received 1,400 mgm. of the drug over a 14-week period, during which time the patient experienced a fairly typical primary attack of malaria. *G. Covell*

MILLER, M. J. **Further Studies on Malaria Suppression by Monthly Drug Administration.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 625–37, 3 figs. [15 refs.]

The studies here recorded were conducted in the coastal area of Marshall Territory in Liberia, an intensely malarious region where transmission is possible throughout the year [this *Bulletin*, 1954, v. 51, 1036; 1956, v. 53, 281]. The predominant malaria parasite is *Plasmodium falciparum.*

Four experiments designed to test the efficacy of drugs for the suppression of malaria in indigenous West Africans are described. In three of these pyrimethamine was given; in the fourth, pyrimethamine plus chloroquine. All drugs were given at monthly intervals, adults and children of 3 years and over receiving pyrimethamine in 25 mgm. doses and chloroquine, where this was given, in 150 mgm. (base) doses, and children under 3 years half this dose. Infants under 3 months old were excluded.

In Experiment 1, 90 to 176 women and children received pyrimethamine or pyrimethamine plus chloroquine over a period of 18 months. In Experiment 2, three groups of adult males, 300 to 375 in each group, received pyrimethamine only for 24 months. In Experiment 3 a small group of 20 adult males who had been intensively studied without treatment for 12 months were given pyrimethamine only for one year. The subjects of Experiment 4, who also received pyrimethamine only, were adults and children living under indigenous village conditions, the numbers treated varying from 32 to 49 children and 72 to 99 adults.

The results of these experiments indicated that pyrimethamine in the dosage given was effective in markedly lowering the parasite rate and reducing malaria attacks for periods ranging from 1 to 2 years. The author suggests that resistance to pyrimethamine is probably a rarer phenomenon in Liberia than reports from East Africa would indicate for that area [*ibid.*, 1954, v. 51, 677, 678; 1955, v. 52, 248]. *G. Covell*

TRINIDAD GOVT. **Annual Report of the Malaria Division, Health Department, Trinidad & Tobago, 1956.** 64 mimeographed pp., 5 graphs, 2 figs. & 9 pp. of tables. [1957.] Port of Spain, B.W.I.

The work of the Division for 1956 is reported on in great detail under the following heads: Malaria Studies, Anopheline Investigations, Malaria Control, Anti-*Aëdes Aegypti* Measures, Special Reports and General. There was no epidemic of malaria in any part of the Colony during the year and an appreciable fall in malaria transmission. Of 2,680 slides examined by the slide diagnostic service, 274 (10·2%) were positive, of which 80% were *P. falciparum.* The majority of positives were found in a triangular area whose apex is at Arima and baseline between Toco and Manzanilla.

Despite its fragility for experimental purposes it was possible to carry out tests by the Busvine-Nash technique on *Anopheles aquasalis* to detect resistance of this mosquito to DDT. 2% DDT gave a 90% kill, 1% a 72% kill and 0·5% a 46% kill in 24 hours. The dissection of 3,787 specimens of *Anopheles homunculus* revealed no infection with malaria. Considerable work is in progress on the possibility of resistance of *Aëdes aegypti* to insecticides. Attempts to rear a susceptible colony of *Aëdes aegypti* from eggs from sources outside Trinidad have failed. A detailed account is given of 13 field stations at which field assistants carry on the duties of *A. aquasalis* dawn trap operations, larval surveys, house, stable and outdoor searches for *Anopheles*.

From the section on Malaria Control it is evident that practically every house in the colony was sprayed at least once with DDT during the year. Bromeliad malaria continues to be controlled by the spraying of the host plants of *A. bellator* with copper sulphate and their manual removal wherever necessary. Despite the use of insecticides for adult control very considerable temporary measures against mosquito breeding are continued, notably around the principal airport of the colony; these temporary measures include drainage, clearance of existing drains and oiling where necessary. The building of a new road through mangrove swamp in the Laventille area has caused a big increase in *A. aquasalis* breeding and in consequence the more liberal use of oil as larvicide.

The eradication work, originally laid down by the five-year plan of the Trinidad Government and the Rockefeller Foundation, has been continued in Tobago from Government funds. All blood slides of schoolchildren were negative. Swamp drainage and its maintenance to control *A. aquasalis* are also being continued. One residual spraying operation was carried out during 1956 with Gammexane emulsion.

A complete list of areas at which *Aëdes aegypti* control measures are in operation is quoted with the initial index and the index at the end of the year; heavy falls are the rule, from double figures down to fractions.

Two special reports are included, one on tree hole breeding of *A. aegypti* in Arima [see below, p. 27], the other on precipitin studies on *A. aquasalis*, the coastal vector of malaria.

[The report makes rather difficult reading, of interest, no doubt, to those familiar with the terrain, but to the malariologist or entomologist in other countries some form of assessment of the year's work and the lessons learnt, particularly from the observations at the field stations, would be valuable.] *R. Ford Tredre*

Bray, R. S. **Studies on Malaria in Chimpanzees. II.** *Plasmodium vivax. Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 514–20. [12 refs.]

This paper describes, first, blood infections and, second, the liver stages of *Plasmodium vivax* in 2-year-old chimpanzees, after inoculation

of sporozoites of the Madagascar strain of the parasite. In the first experiment the salivary glands of 35 *Anopheles maculipennis atroparvus* (with a 70% infection rate) were inoculated intravenously and a liver biopsy was performed 8 days later. No parasites were found in the liver or blood, so a splenectomy was performed about 4 months later and this was followed by a heavy parasitaemia reaching 15,000 parasites/cmm. of blood, indicating that a sub-microscopic parasitaemia can persist for 4 months in intact chimpanzees. In the second experiment, *A. gambiae* were allowed to feed on the above animal on the 3rd, 6th and 12th–15th days of patency; infection occurred in the mosquitoes of all batches, but was heaviest in the last, and the salivary glands of 140 of these were inoculated intravenously into a second splenectomized chimpanzee. Liver biopsies were done on the 8th and 15th days after this inoculation, and pre- and exo-erythrocytic schizonts of similar morphology were found in the infective material. Parasitaemia ensued 7 days 23 hours after infection. In both these experiments, human volunteers were successfully infected with the sporozoites. In the chimpanzee, the blood forms were typical of *P. vivax* with possibly a few minor exceptions: double invasion of the erythrocytes was common, the mature microgametocyte occupied only half the corpuscle and schizogony took place in 46 hours.

A detailed description is given of the tissue forms of the parasite before maturity, just prior to merozoite formations, at maturity, and after rupture. The 8th day material contained about 20,000 of these forms per cmm. of liver tissue; the 15th day density was reduced to 500. The length of pre-erythrocytic schizogony appeared to be 7½ days. The immature parasites were characterized by the presence of large and small vacuoles and sparsely distributed nuclei especially in the shape of bars, a few of which were faintly Feulgen positive. Nuclear division then occurred, and finally merozoite ($1{\cdot}1\mu$–$1{\cdot}4\mu$) formation, when the chromatin became Feulgen positive. The shape of all these parasites was ovoid, measuring about $52\mu \times 44\mu$ in contrast to the spherical shape of *P. cynomolgi*, only 42μ in diameter. Phagocytosis of ruptured schizonts was undertaken by monocytes and polymorphonuclear leucocytes.

[See also Rodhain and Dellaert, this *Bulletin*, 1956, v. 53, 860, 1212, 1213.] *P. C. C. Garnham*

Bray, R. S. **Studies on Malaria in Chimpanzees. III.—Gametogony of** *Plasmodium reichenowi*. *Ann. Soc. Belge de Méd. Trop.* 1957, Apr. 30, v. 37, No. 2, 169–74, 11 diagrams.

The author has already described [this *Bulletin*, 1957, v. 54, 653] certain features of *Plasmodium reichenowi* as seen in Liberian chimpanzees. Here he gives details of the development of the gametocytes in a splenectomized animal a year old. The infection rose to a crisis on the 13th day after the operation, immature gametocytes making an early and

schizonts a late appearance (the latter in a 46-hour cycle). Little maturation of the gametocytes occurred for 3 weeks; sulphonamide therapy was begun, the asexual infection became obliterated and the gametocytes came into their own (350/cmm. blood). The youngest sexual forms were triangular or oblong with pigment in dots and bars; with growth they became sausage-shaped with condensed pigment; later the ends became square, and finally the typical crescent shape was assumed. The infected red blood cell became "etiolated", but showed no inclusions. Double and even triple invasion of the corpuscle occurred.

600 *Anopheles gambiae* were allowed to feed on this chimpanzee on the 11th, 28th, 29th, 30th and 41st days after splenectomy. No infection of the mosquitoes, fed on the first and last of these days took place, but 4 out of 86 from the intervening batches showed oöcysts. One oöcyst was apparently normal, but the other 3 were degenerate. They measured between 30μ and 40μ in diameter. No sporozoites were seen, and it is clear that *A. gambiae* is an unsuitable host for *P. reichenowi*, though highly satisfactory for the human *P. falciparum*.

[Garnham *et al.* (*ibid.*, 1957, v. 54, 1292) have also recently described the developmental forms of *P. reichenowi* and noted that the pigment granules in the gametocytes were nearly always in the form of long bars; in other respects the descriptions in the two papers practically tally.]

P. C. C. Garnham

Bray, R. S. **Additional Notes on the Tissue Stages of** *Plasmodium cynomolgi*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, May, v. 51, No. 3, 248–52.

The author describes the 1-day-old pre-erythrocytic stage of *Plasmodium cynomolgi*, thereby filling the gap in our knowledge of the tissue development of this parasite, later stages of which had been previously described [this *Bulletin*, 1954, v. 51, 883]. In the experiment which led to this discovery, sporozoites from the salivary glands of 500 and 100–200 infected mosquitoes (*Anopheles maculipennis atroparvus*) respectively were inoculated intravenously into 1 and into 2 monkeys (*Macaca mulatta*), and pieces of their livers were removed (by biopsy and at autopsy), 1, 3, 8, 28, 62, 86 and 102 days later, after which stained liver sections were examined for the presence of parasites.

When 1 day old, the trophozoite is a round, uninucleate body containing a small vacuole, and is situated within a parenchyma liver cell, which remains normal in appearance. The 3-day-old schizonts have an average diameter of 5·4μ and typically contain 8 nuclei, while the host cells show definite changes revealed in the reduction of the basophilic staining reaction of the cytoplasm and in the presence in it of abundant vacuoles. In addition to the multinucleate schizonts, the liver material taken 3 days after infection contained numerous uninucleate parasites, which are thought to be young forms that failed to develop further or were

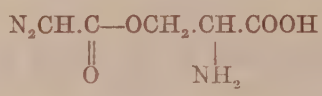
degenerating. Exo-erythrocytic schizogony was at its height 8 days after inoculation, when the number of parasites was estimated to reach 300,000 per ccm. of liver, without showing any evidence of cellular reaction. No schizonts could be found in material taken between 28 and 86 days after infection, but scanty tissue forms were present in sections of the liver 102 days after infection: it is noted that this development coincides with a relapse of parasitaemia.

From these data the author visualizes the following pattern of EE schizogony in *P. cynomolgi*. The 1st generation of parasites represents 5–10% of the sporozoites inoculated; in the 2nd generation the number of parasites drops abruptly to 5% of that in the 1st generation; and thereafter remains at a low and undetectable level, until by the 100th day there is again an increase in numbers before re-invasion of the blood.

C. A. Hoare

McCarthy, D. A., Bayles, Anita & Thompson, P. E. **The Effect of Azaserine against *Plasmodium lophurae* in Chicks and Attempts to antagonize this Effect with Metabolites.** *J. Parasitology.* 1957, June, v. 43, No. 3, 283–90, 1 fig. [23 refs.]

The antibiotic Azaserine (O-diazoacetyl-L-serine) of the following constitution



$$N_2CH.\underset{\underset{O}{\|}}{C}—OCH_2.\underset{\underset{NH_2}{|}}{CH}.COOH$$

has been shown to prevent the growth of tumours and has a wide range of activity against micro-organisms including bacteria, also against *P. lophurae* and *E. histolytica* [this *Bulletin*, 1957, v. 54, 289]. The anti-malarial activity of the substance has now been further investigated. Chicks 6 to 8 days old were infected by intravenous injection of 10^9 parasites per kgm. body weight. Drugs tested were included in the diet on the day before injection or were given intraperitoneally, quinine being used as a reference standard [*ibid.*, 1953, v. 50, 603]. The ability of 22 substances to interfere with the action of Azaserine, and thus indicate its mode of action, was examined by methods described [*ibid.*, 1953, v. 50, 912], which consisted in the use of Azaserine and antagonist alone and in combination. All attempts to antagonize the action of Azaserine by amino-acids, a list of which is included, were unsuccessful. The mode of action against plasmodia appears to differ from that of a number of substituted benzoic acids.

J. D. Fulton

BLACKWATER FEVER

BARRAUD, P. & LAISON, I. La fièvre bilieuse hémoglobinurique (F.B.H.) chez le jeune Africain. A propos de quatre cas. [**Blackwater Fever in African Children; a Report of 4 Cases**] *Méd. Trop.* Marseilles. 1957, May–June, v. 17, No. 3, 363–9.

This ebullient paper describes 4 cases of blackwater fever in children of between 2 years 4 months and 12 years, encountered in a rural hospital in French Togoland. All 4 patients were the children of sophisticated African parents, and in each there was a history of the intermittent administration of quinine.

In the first patient, aged 5 years, the correct diagnosis was not made until the 3rd day after admission, shortly before the development of a fatal circulatory collapse. After this experience, which emphasized the triad of cardinal signs—fever, vomiting and haemoglobinuria—in the 3 succeeding patients the diagnosis was established on admission and treatment was successful.

The paper is notable for the astonishing range and complexity of therapy which is recommended. Treatment begins with the establishment of a continuous intravenous drip through which are administered antivenene, Phenergan [promethazine] (to inhibit haemolysis), Gardenal [phenobarbitone], and novacaine, together with vitamins C and P or K, while cortisone, penicillin and "Spartocamphre" are injected into the muscles. Infiltration of the renal pedicles with novocaine may be required to relieve anuria, though the simpler diuretics champagne and "Kinkélibah" are usually all that are necessary.

The subsequent anaemia is treated by whole blood transfusion, and by the exhibition of liver extract, methionine, foline and vitamin B12. Ancillary methods which may be used include a rectal drip of "*sérum glucosé bicarbonaté*", atropine and potassium chloride.

Antimalarial therapy is continued with chloroquine or nivaquine on the cessation of vomiting.

[This paper is of interest as illustrating a fundamentally different approach to therapy from that of English medicine.] *J. H. Walters*

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

WEST AFRICAN INSTITUTE FOR TRYPANOSOMIASIS RESEARCH. **Annual Report 1956** [NASH, T. A. M., Director]. 40 pp. 1957. Kaduna, Northern Nigeria.

The Director, Dr. Nash, reviews the staff position and certain financial features of the year and then gives an account of the work of the institution since the previous annual report [see this *Bulletin*, 1957, v. 54, 132]. The main features are briefly outlined below, but this interesting and considerable record of achievement should be consulted in the original by all concerned with the problems of trypanosomiasis in man and animals.

The treatment of Gambian sleeping sickness by Melarsen has been further investigated; this drug at dosages of 20 and 30 mgm./kgm. gave satisfactory results both with previously untreated cases and with relapsed cases in early, intermediate and advanced stages; it was more effective than the standard courses containing tryparsamide in advanced cases. The dosage of 20 mgm./kgm. is regarded as sufficiently safe for field use, since only 2·8% of the patients developed serious reactions. It is concluded that Melarsen is a valuable alternative drug for treatment of *T. gambiense* infections under field conditions, especially for late stages and relapsed cases. Trials of Berenil [di-(4-amidino-phenyl)-triazene-(N-1:3)-diaceturate $3H_2O$] given intramuscularly at 2 mgm./kgm. show it to be well tolerated; by the end of the course all patients were both gland-negative and blood-negative, and are being kept under observation.

The chemical composition of the saliva of *Glossina palpalis* has been determined [see *ibid.*, 1957, v. 54, 268, 269]; it is hoped that this knowledge will help the solution of the problems of culturing trypanosomes. The sulphosalicylic acid method for estimating cerebrospinal fluid protein (with the MRC wedge photometer) has given good results in the field and is regarded as simpler to use and potentially more accurate than the Siccard-Cantaloube method.

Turning to animal trypanosomiasis, tests of the protective value of the suramin complexes and other drugs have been carried out on rats and mice, with 14 different drugs and drug complexes at various dosages; these have shown, among other things, that one subcutaneous injection of the Antrycide-suramin complex at 26 mgm./kgm. would protect rats for over 39 weeks, and for 53 weeks if given at 201 mgm./kgm. The prophylactic period tends to increase with increasing dosage of both the Antrycide dimethyl sulphate and the Antrycide-suramin complex. A new Boots drug, RD 2902, is stated to show marked prophylactic activity both alone and in the suramin complex form. A "Phase I" trial (small scale field trial), in which 67 cattle were used and 18 different drugs tested in varying combinations and dosages, showed break-through after periods varying between 1 month (Antrycide dimethyl sulphate and the Berenil-suramin complex, at 5 mgm./kgm.) and 13 months (ethidium-bromide-suramin complex at 10 mgm./kgm.); the prothidium-suramin and the RD 2902-suramin complexes at 10 mgm./kgm., and the latter at 20 mgm./kgm., were still protecting at 6 and 5 months; the most noteworthy results were those from the ethidium-bromide-suramin complex, as this does not appear to produce drug resistant strains readily, which

the Antrycide-suramin complex seems to do. A "Phase II" test with 24 animals treated with ethidium-bromide-suramin complex at 5, 7½ and 10 mgm./kgm. dosages is in progress, with 9 challenged controls and 4 unchallenged ones (to give information about normal fluctuations in weight, etc.); some trouble is being experienced with local reactions at the site of injection, but there are no generalized toxic symptoms. Trial of various drugs against *Trypanosoma simiae*, with rabbits, suggested that ethidium bromide, Cinnalone 528 and suramin would be worth further investigation; these, with a number of other drugs, were tested in pigs but all failed to effect cure, except the Antrycide pro-salt at 11·7 mgm./kgm., Antrycide chloride at 50 mgm./kgm. and the Antrycide-suramin complex at 5, 10, 20 and 40 mgm./kgm. A certain amount of residual prophylaxis was exhibited, amounting to 25 weeks with Antrycide chloride at 50 mgm./kgm. and 14 to 26 weeks with the Antrycide-suramin complex at various dosages.

Investigation of the insect vector showed the infection rate of 6 species of tsetse at the forest field station at Ugbobigha to vary from 2% in *Glossina palpalis* to 27% in *G. nigrofusca*; the other species investigated were *G. longipalpis* (21% infection), *G. fusca* (15%), *G. medicorum* (14%) and *G. tabaniformis* (4·5%); the relative proportions infected with *T. vivax* and *T. congolense* varied with the species of tsetse; only 2 out of over 7,000 flies (1 *G. longipalpis* and 1 *G. tabaniformis*) showed infected salivary glands; *G. longipalpis* appeared to be the most important fly from the veterinary aspect, since although not quite so highly infected as *G. nigrofusca* it is a much more abundant species. Study of the seasonal fluctuations of *G. palpalis* suggests that excessive rain is the unfavourable factor in the forest areas of Southern Nigeria, whereas in the savannah regions of Northern Nigeria it is the excessive heat and desiccation of the dry season that is adverse. Similar studies of *G. longipalpis* show that this species needs an island of forest for refuge during the hottest driest time of year, though it may persist in the savannah, into which it penetrates but little, for most of the year if pools supporting thicker vegetation are available; it is believed that control measures could be confined to the permanent habitat. Field experiments have shown that obstructive clearing [see this *Bulletin*, 1957, v. 54, 1261] will exterminate *G. palpalis* if isolation is complete; its application is being explored on a large scale by the Sleeping Sickness Service, Northern Region; so far, although it has proved a complete failure in one area where violent stream flow rapidly carried away the obstructing felled trash, in flatter country elsewhere the results have been satisfactory.

Studies on man-fly contact with marked *G. palpalis* have shown that this species has a greater tendency to concentrate at waterholes, even in the wet season, in the Kaduna area where sleeping sickness is rife, than at Ugbobigha where there is none. In the first area there is a 10 times greater chance than in the second that a fly taking an infecting feed at a waterhole will still be there after 18 days, a period long enough

for it to become infective; the rarity of sleeping sickness in the forest areas of Southern Nigeria may be connected with this. Identification of the blood meals of tsetse by serological methods has shown that more than half of the *G. palpalis* examined had fed on reptiles whereas more than three-quarters of the *G. morsitans* had fed on pigs [see also *ibid.*, 1957, v. 54, 400, 657]. Laboratory investigations showed that mating took place more readily during the first than during the second week of female life; that second and more matings could take place, more particularly during the first week (mean 2·2 from 99 females, of which 4 actually mated 5 times) than the second week (mean 1·4–74 females); and that females mated when young (3rd day) only seldom mated again (4 occasions out of 578 opportunities). Some details are given of the interference with laboratory maintenance of *G. palpalis* by the predatory activities of earwigs (*Marava arachidis*), which reduced the 1955 total of 12,923 pupae and clean flies issued for experimental work to one of 8,210; the average monthly production of pupae during the year was 2,500, the lowest figure since 1952. *W. H. Potts*

SAUNDERS, G. F. T. **Human Trypanosomiasis: the Guo-Sabule Outbreak.** *West African Med. J.* 1957, Sept., v. 6 (n.s.), No. 3, 108–12. [26 refs.]

An outbreak of trypanosomiasis in Ghana reported by AKWEI [this *Bulletin*, 1952, v. 49, 1032], was considered by him to have been discovered at an early stage. MCLETCHIE [*ibid.*, 1954, v. 51, 26] cast doubt on this, and Dr. Saunders now enters the lists on Akwei's behalf, replying to McLetchie's arguments one by one. He considers that, as with another outbreak reported by HARDING and HUTCHINSON [*ibid.*, 1948, v. 45, 410], something caused the simultaneous occurrence of a large number of cases, discovered early; little epidemics tend to flare up and die out in Ghana, owing to changes in position of farms, etc. In the author's view, *T. gambiense* generally appears in the blood before it appears in the glands; outbreaks with a high percentage of blood trypanosomes are probably either new epidemics or recrudescences in an early stage.

Arsenic resistance is rare in Ghana, but an occasional case is seen in which trypanosomes have not disappeared from the blood after 7 or 8 injections of tryparsamide. *B. B. Waddy*

BAKER, J. R. & ROBERTSON, D. H. H. **An Experiment on the Infectivity to *Glossina morsitans* of a Strain of *Trypanosoma rhodesiense* and of a Strain of *T. brucei*, with some Observations on the Longevity of Infected Flies.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 121–35, 2 figs. [26 refs.]

The authors describe experiments on the infection of *Glossina morsitans* under carefully controlled conditions with two strains of trypanosomes

recently isolated from *G. pallidipes* from south-east Busoga in Uganda; these had been maintained cyclically in guineapigs. One strain could infect man and was therefore regarded as *Trypanosoma rhodesiense*; the other could not and was therefore *T. brucei*. Morphologically the two strains were indistinguishable and their virulence towards rats was not very dissimilar, the first killing in an average of 22 days and the second in about 12 days. Full details are given of the methods used to infect the experimental flies, particular care being taken to determine the state of infection of the guineapigs at the time of the infecting feed. The flies, which were from "wild" pupae incubated at approximately 30°C., were maintained singly in tubes.

The two strains showed equal ability to infect the flies, and this result is discussed in light of the views of Fairbairn and Culwick [see this *Bulletin*, 1950, v. 47, 605] and of Duke [*ibid.*, 1928, v. 25, 759] and Robertson [*ibid*,. 1913, v. 2, 244]. Female flies were infected in the same proportion as the males and this result is compared with those of Duke [*ibid.*, 1933, v. 30, 770] who found a higher proportion of females infected, and Burtt [*ibid.*, 1946, v. 43, 828] and Fairbairn and Culwick [*loc. cit.*] who had found the reverse. Longevity of the flies was not affected by infection [*cf.* Duke, *ibid.*, 1928, v. 25, 785]. No support was found for Robertson's view that the short trypanosome forms were the infective forms [see *ibid.*, 1913, v. 2, 244; 1930, v. 27, 846]. The female flies lived longer than the males [*cf.* Willett, *ibid.*, 1954, v. 51, 778], and this appeared to be associated with infection of the salivary glands. The survival curves of the uninfected flies were of the same nature as those described by Kershaw and his colleagues for mosquitoes and *Chrysops* [*ibid.*, 1954, v. 51, 83; 1955, v. 52, 186, 584], and indicate that increase in mortality with age is general in insects maintained in the laboratory. Examination of the "saliva" extruded on slides showed that the proventricular trypanosomes do not invade the salivary glands and suggests that the extruded fluid is not entirely "saliva", thus agreeing rather with the observations of Lewis and Langridge [*ibid.*, 1947, v. 44, 980] rather than with those of earlier authors.

The main object of this work was to contribute to the solution of the question whether the tsetse fly or the trypanosome is the prime agent in determining the proportion of flies which will become infected and the authors conclude that in this experiment, whether or not the fly itself exerts any influence, the two strains used, though differing in their power to infect man, were equally able to infect the fly. *W. H. Potts*

Tobie, Eleanor J. **The Trypanocidal Effect of Nucleocidin in vivo.** *J. Parasitology.* 1957, June, v. 43, No. 3, 291–3.

The antibiotic nucleocidin has been reported to possess marked activity against *Trypanosoma equiperdum*. It has now been tested against *T.*

congolense, *T. equinium* and *T. gambiense*. Mice of 20 gm. and rats of 200 gm. were infected and maintained as described by TOBIE [this *Bulletin*, 1955, v. 52, 134]. Treatment generally consisted of thrice daily treatment with 0·05 mgm./kgm. of the antibiotic subcutaneously. Observations on the blood were made up to 60 days after inoculation.

In a total of 109 animals treated only 6 mice infected with *T. congolense* relapsed, indicating a cure rate of 95%. In the case of *T. equinium* approximately the same rate of cure was obtained in mice. Approximately 70% of mice infected with *T. gambiense* were also cured, depending on time of treatment and size of inoculum. The substance was apparently somewhat toxic. *J. D. Fulton*

RUBIO, Mafalda. Mitosis en células parasitadas por *Trypanosoma cruzi*. Estudio en animales de laboratorio. [**Mitosis in Cells Parasitized by *Trypanosoma cruzi*. Studies in Laboratory Animals**] *Biológica*. Santiago. 1956, v. 22, 51–61, 21 figs. on 5 pls. English summary.

PERLOWAGORA-SZUMLEWICZ, Alina. A eficácia do expurgo domiciliário com dieldrin no contrôle do vetor da doença de Chagas. [**Efficacy of House Spraying with Dieldrin in the Control of the Vector of Chagas's Disease**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1956, Jan., v. 8, No. 1, 289–304, 1 fig. [11 refs.] English summary.

Two pairs of similar huts, constructed along the lines of ordinary human dwellings in the area, were individually enclosed in a wire screen compound. Each of the pairs of huts (experimental and control) was infested with a total of 1,075 and 1,275 laboratory reared *Triatoma infestans* respectively; the bugs used comprised adults and nymphs of instars III, IV and V. The walls and roof of each experimental hut were sprayed with dieldrin at the rate of 7·2 and 3·1 gm./metre^2 respectively. A partially plucked chicken as a blood source was enclosed daily in the compound of each hut, and daily counts of dead bugs were recorded in each case. The hut sprayed with the higher dosage was demolished after 4 months, and the lower after 8 months; in both cases, counts of dead and surviving bugs were made.

Results indicated that a single application of dieldrin, even at 7·2 gm./metre^2, failed to eradicate the bugs completely, but that the population was reduced by 99·4% in 4 months at this dosage, compared with the control. Survival of a few bugs was attributed to the cryptic habits of fully-fed bugs, which were responsible for some repopulation 4 to 8 months after spraying. Progeny produced before treatment failed to survive at all, owing to a greater susceptibility during instars I and II.

[The full implications of these experiments are too lengthy for

quotation here, and the reader is referred to the original text for complete data and discussion.] *N. R. Phillips*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

HERRER, A. Repercusión del uso casero de los insecticidas en la incidencia de la leishmaniasis tegumentaria del perro. [**Effects of the Domestic Use of Insecticides on the Incidence of Cutaneous Leishmaniasis in Dogs**] *Rev. Med. Exper.* Lima. 1956, Dec., v. 10, No. 2, 139–45, 2 figs.

The English summary appended to the paper is as follows:—

"1. The results of observations made in the Canchacalla Valley in Peru of tegumentary leishmaniasis in dogs are shown. These results are interpreted as being the effects from the domestic use of insecticides with a high toxicity and long residual action against phlebotomus. The observations were made during three periods of time namely, from 1945 to 1948, in 1951 and in 1956. The observed incidence of tegumentary leishmaniasis in dogs for these periods were 56·2, 50·0 and 14·7 per cent respectively.

"2. There was a remarkable drop in the incidence in 1956. This drop is interpreted as a result of the domestic use of modern insecticides, due to the fact that no regular programs of insect eradication have been carried out so far in the Valley either by private or official organization.

"3. Finally, consideration is given to the fact that some medically important arthropods might be developing resistance to modern insecticides due to the domestic use of said insecticides."

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

EL-GAMMAL, M. Y. **The Blood and Bone Marrow Pictures in Typhus.** *J. Egyptian Med. Ass.* 1957, v. 40, Nos. 3/4, 161–8. [14 refs.]

There are few studies of the blood changes in typhus and fewer still deal with the bone-marrow. The author examined 45 patients during the

1944 epidemic of louse-borne typhus in Egypt. There were 34 men and 11 women. 11 were aged 10–19, 24 were 20–29, and 10 were 30–45. The blood was examined in the second week of the fever in 38 cases and in 7 during the first week. There was no specific anaemia and, although 26 of the 45 patients had a colour index below 0·9, the author does not think that this signifies much because the most likely victims of typhus are those who are already suffering from nutritional or parasitic anaemias prevailing in Egypt. The most constant findings in the white cell count were marked toxic changes of the polymorphonuclear cells and a "shift to the left", stab forms ranging from 20 to 60% of the total count. The toxic changes presented as coarse basophilic granulations and, in some instances, as vacuolation of the cytoplasm. The total white cell count was between 5,000 and 10,000 per cmm. in 19 and above 10,000 in 17 cases; only 5 patients had white counts below 5,000 per cmm.

The bone-marrow was examined in 43 patients and the results are given in some detail. The most striking feature was the proliferation of the reticulum cells. Whereas normally these only contribute 1–2% to the total number, in this series the percentage varied from 3 to 21% and a significant proportion of them were phagocytic forms. The erythroblastic elements showed no significant change and there was no striking increase in the number of megakaryocytes. *H. Lehmann*

HOCKING, B. **Louse Control through Textile Fibre Size.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 507–14, 1 text fig. & 10 figs. on 3 pls. [15 refs.]

Studies of the size of claws of different kinds of lice show that they are related to the thickness of the hair of the various hosts. Human body lice spend most of their time climbing over undergarments and the author has made a preliminary investigation of the possibility of rendering such garments inimical to lice, by using abnormally thick or thin fibres. He measured the forces necessary to detach single adult lice from various kinds of natural and synthetic fibres, with the aid of a torsion balance and a kymograph motor. The force was moderate with very thin fibres and rose to a maximum (about 440 times the weight of the louse) for fibres approximating in diameter to human hair. (Optima for female lice, 43 μ; for males, 25 μ. Average for human hair, 17–170 μ; for body hair, 60 μ.) Fibres thicker than 200 μ could not be gripped by the claws of the lice, which tried to hold on by their legs, but not very effectively. Therefore, they were fairly easily detached from fabric made of thick synthetic fibres.

The ability of lice to grab hold of a fabric when dropped onto an inclined surface of it was also found to vary with fibre diameter in the same way as the efficiency of grip, but less exactly. The number of eggs laid on different fabrics when no choice was offered was also related to fibre diameter in a similar way.

Fabrics woven of the thick fibres unfavourable to lice would probably be uncomfortable to wear next to the skin. However, such fabrics might make suitable outer protective garments for medical and sanitary people engaged in louse control. *J. R. Busvine*

BADIALI, C. Ricerche sull'eventuale presenza di anticorpi anti-*R. akari*. [**Investigation of the Presence of Antibodies against** *Rickettsia akari*] *Nuovi Ann. d'Igiene e Microbiol.* 1957, July–Aug., v. 8, No. 4, 422–5. [14 refs.]

The English summary appended to the paper is as follows:—

"The Author has looked for the presence of anti-*R. akari* antibodies in the sera of 124 individuals. All the sera were negative but two, one of which was taken from a patient (a woman) hospitalized for suspected boutonneuse fever. The Author thus concludes that in the population of the district where the research has been carried out (Emilia-Romagna) there is not any serologic evidence of an infection due to *R. akari*."

SAUTET, J. & DESANTI, E. A propos de la découverte à Marseille d'un cas de fièvre Q: Cette maladie doit-elle être inscrite parmi les maladies professionnelles indemnisables? [**Discovery of a Case of Q Fever in Marseilles. Should this Condition be included as an Occupational Disease?**] *Arch. Malad. Professionnelles.* Paris. 1957, Sept.–Oct., v. 18, No. 5, 604–6.

See this *Bulletin*, 1957, v. 54, 805.

BÁRDOŠ, V., BREZINA, R., KRAMÁR, T., SOBĚSLAVSKÝ, O. & ŠIMONÍK, F. **An Epidemic of Q Fever in a Factory caused by working with Contaminated Imported Cotton.** *J. Hygiene, Epidemiol., Microbiol. & Immunol.* Prague. 1957, v. 1, No. 1, 43–8, 1 graph. [11 refs.]

In October 1954 among workers in a cotton spinning factory in Czechoslovakia, examples of an acute febrile illness began to appear in epidemic proportions. In all, between the months of October and December, the disease affected 40 persons. The simultaneous occurrence of the illness in groups of workers, the lack of evidence of case-to-case transmission and the freedom from disease of home contacts clearly indicated that the factory was the source of infection, and an investigation within its precincts was begun at the beginning of December 1954. This revealed that 36 of the 40 affected workers had been employed in Spinning Room No. 3, whereas the other 3 spinning rooms, together with the rest of the factory, contributed only 4. Spinning Room No. 3 was unique in the antiquity of its machinery and the inadequacy of its ventilation which combined to render it infinitely more dusty than any of the

other working sites. In the ground floor room, significantly called the "Blowing Room", where the cotton bales were broken open, the attack rate among the workers was 30%, in the carding room it was 25%, in the room containing the drawing frames it was 9%, while in the spinning room it was only 4·1%. This decreasing incidence reflects the reduction in the amount of suspended dust engendered by the successive manufacturing processes.

The disease was identified as Q fever early in December 1954 by the detection of complement-fixing antibodies to *Rickettsia burneti* in the blood of all those affected. 3 patients showed a conversion of the CFT from negative to positive during their illness, in 5 more a significant rise in antibody titre was noted and in the remaining 32 a retrospective diagnosis was made on the result of a single test. [The titres obtained are not stated.] No CF antibody to ornithosis virus was found in any patient.

The illness was manifested in two forms, the typhoidal and the pneumonic. In both, the initial symptoms comprised malaise, headache, fever and stabbing pains in the chest, and in all patients a palpable degree of splenomegaly and a neutropenia developed. Chloramphenicol therapy was dramatically successful in those patients in whom it was used; the majority, however, recovered uneventfully without specific treatment. There were no deaths.

The infecting agent appeared to have had its origin in two consignments of bales imported from the same source, which were issued exclusively to Spinning Room No. 3 and were manufactured between September 13 and November 11, 1954. Samples of cotton from these bales were teased out and used as bedding for groups of mice, which were killed after 30 days' exposure. Emulsions of splenic tissue from these mice were passed to guineapigs, in whose blood CF antibody to *R. burneti* became demonstrable after 20–30 days. After 3 passages through guineapigs, the yolk sacs of 8-day-old chick embryos were successfully infected with splenic homogenate, and impression preparations from them, when treated with boiling Giemsa stain, revealed oval cocco-bacillary bodies morphologically resembling *Rickettsia burneti*. The organism could be passed back to fresh guineapigs from this yolk-sac material.

[This fascinating epidemiological story so skilfully worked out, leaves one to guess the country of origin of the infected cotton.]

J. H. Walters

Sipka, M. & Miljkovic-Krejakovic, V. **Q Fever in Milking Cattle in Yugoslavia.** *Acta Microbiologica Hellenica.* Athens. 1957, May–June, v. 2, No. 3, 155–61, 2 figs. [20 refs.]

Complement-fixation tests were positive in 0·91% of 1,426 cows. Of 13 of these 11 secreted *R. burneti* in the milk.

Burganskii, B. K., Kaplinskii, M. B., Vygovskii, A. P. & Berdnikov, I. F. **Q Fever in the Urals.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 3, 349–54. [Translated from Russian.]

This paper summarizes the clinical features of Q fever as observed in recent outbreaks in the Urals and gives a rambling account of investigations of the part played by domestic animals as sources of infection. In Kirov oblast, the presence of Q rickettsiosis was confirmed [by unspecified methods] in horses, cattle and goats. It is thought that the infection of domestic animals in this focus "probably occurred on pastures (from ticks) with further spread of infection among the animals by droplet and contact infection (possibly also by vectors); human beings were infected from domestic animals, mainly horses, on account of the frequent contact on the building sites". Human cases of Q fever were also seen in Sverdlovsk, Magnitogorsk, Cheliabinsk and Kustanai oblasts; in the Sverdlovsk oblast, the sero of 4 out of 8 horses gave positive agglutination tests with *Rickettsia burneti* antigen.

Preventive measures included instruction of medical workers on the clinical features, epidemiology, diagnosis and prophylaxis of the disease; disinfection of stables and anti-tick measures; anti-rodent measures; personal delousing; and in areas where cows and goats were affected "it was forbidden to use unboiled milk".

[The epidemiological observations recorded in this paper are set out in a disconnected manner, leaving much to the imagination.]

R. S. F. Hennessey

Zhmaeva, Z. M. & Pchelkina, A. A. **Domestic Birds as Carriers of the *Rickettsia* of Q Fever in the Turkmen S.S.R.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 3, 347–9, 1 fig. [Translated from Russian.]

The possibility of domestic fowl being a reservoir of *Rickettsia burneti* was investigated in an area of the Turkmen S.S.R., where 2 human cases of Q fever occurred and where it was thought that the infection might have been contracted by eating raw eggs. Strains of rickettsiae were isolated by inoculating guineapigs (a) with a suspension of the brain and liver of 2 cocks and (b) with a suspension of egg shell and shell membrane [apparently from 9 eggs]. Sera from infected guineapigs gave positive complement-fixation tests with Q fever antigen. A strain recovered from egg shell and shell membrane was transmitted experimentally to lemmings (*Lagurus lagurus*) and was easily passaged in these animals. Attempts to isolate rickettsiae from egg yolk and egg white were unsuccessful. It is concluded from these results "that chickens appear to be a possible reservoir of the infective agent of Q fever and that in this actual case

their part in the epidemiology of the disease is beyond doubt". [No mention is made of the source from which the infected cocks and eggs were obtained, nor is it directly stated that the 2 patients with Q fever had eaten eggs from this source.] *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

BOORMAN, J. P. T. & PORTERFIELD, J. S. **A Small Outbreak of Yellow Fever in the Gold Coast.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 439–49, 1 fig. & 1 map.

The level of immunity to yellow fever in the area of Kintampo, Ghana, was determined during 1954. In September 1955 3 adult males died within a period of 8 days of a short illness associated with jaundice, at Kintampo and the neighbouring villages of Kadelso and Kunso. It was decided to carry out a detailed investigation in the village of Punpuano, which had been the centre of the 1954 survey, but sera were collected also at Kadelso and another village for survey purposes, and from any person suffering from jaundice or suspicious fever. Out of 12 persons considered to have yellow fever on clinical grounds, 4 were confirmed, 2 more presumed on good grounds to have died of the disease, 1 was inconclusive and 5 confirmed not to have had it, at least recently. The haemagglutination inhibition [HAI] test [PORTERFIELD, this *Bulletin*, 1955, v. 52, 529; 1956, v. 53, 1416] was used to examine sera, but some negative findings were confirmed by the mouse protection test; some, also, were positive to HAI tests with antigens prepared from Zika, Uganda S, dengue or West Nile viruses. Out of 32 paired sera, collected in 1954 and 1955, 5 had changed from negative to positive in the interval; sera from persons already immune in 1954 showed no significant change in antibody levels.

The findings point conclusively to a fairly intense transmission of yellow fever virus during the year. They indicate also the difficulty of clinical diagnosis when yellow fever occurs sporadically. Of the 6 confirmed cases, 3 acquired their infections in or near Kadelso, but there was no close association between them; the other 3 cases were separate incidents bearing no relation to each other. Apart from the finding that one green monkey, brought from Kadelso to Kintampo as a pet, was immune to yellow fever, there are no data on the immunity state of the local monkeys. "Whilst there is no proof of such a cycle, the hypothesis of

an epidemic of yellow fever in the local monkeys, with occasional transmission to man by *Aëdes africanus*, is consistent with the observed facts. The aetiology of jaundice in the cases which were proved not to be yellow fever must remain a matter for speculation." *B. B. Waddy*

TRINIDAD GOVT. **Annual Report of the Malaria Division, Health Dept., Trinidad & Tobago, 1956. Special Report 1. Tree Hole Breeding of *Aedes aegypti* (Linn) in Arima, Trinidad, B.W.I.** [KELLETT, F. R. S. & OMARDEEN, T. A.]. 10 mimeographed pp., 1 coloured map & 1 fig. [1957.]

After unsatisfactory results with peridomestic spraying against *Aëdes aegypti* in Arima (Trinidad), the authors carried out a detailed tree hole survey of the town. In the 8,045 trees inspected, 63 holes were found with larvae of *A. aegypti*, all in trees planted close to human dwellings. While in most of these the breeding was light, in a few it was very heavy, *e.g.*, a mango tree hole with a total of 150 larvae and pupae. The height of the positive holes varied from near ground level to 34 ft., 87% being above the height of the average perifocal sprayer and hence liable to be overlooked in the normal course of spraying operations. Most of the holes occurred in fruit trees which were well scattered throughout the town. Of those found positive 25 out of 52 were either breadfruit or chataigne, 2 varieties of *Artocarpus communis*; 7 were Avocado (*Persea americana*) and 6 were golden apple (*Spondias cytherea*). All the tree holes were treated with brickettes of BHC in plaster of paris.

During the course of this work, larvae of *Haemagogus spegazzinii* were found in 9 tree holes.

The authors end with a discussion of the possible reasons for the occurrence in Trinidad of these unusual breeding foci so far rarely reported for *A. aegypti* in other countries of the New World. *R. J. Wood*

KOMP, W. H. W. **The Occurrence of *Haemagogus boshelli* in Panama (Diptera, Culicidae).** *Proc. Entom. Soc. of Washington.* 1955, v. 57, No. 4, 181–2. [Summary taken from *Rev. Applied Entom.* Ser. B. 1957, Sept., v. 45, Pt. 9, 150.]

In July 1945, *Haemagogus boshelli* Osorno-Mesa was found in great numbers at a small airfield on the Pacific coast of Panama about 50 miles from the Colombian border. The adults, of which both sexes were collected, were very abundant in the tangle of creepers and aroids on fallen trees in a rice-field south of the runway and in forested areas near by. The females attacked avidly at ground level at all times of the day, even during showers. The larvae were found in almost all containers of water examined, including tree-holes, fallen palm spathes, fruit husks, coconut shells and tins. The only other places in which *H.*

boshelli has been recorded are on the Pacific coast of Colombia and it was considered rare.

Any species of *Haemagogus* that attacks man in numbers at ground level is suspect as a possible vector of jungle yellow fever, particularly if it occurs in an endemic area. In 1952, about 100 deaths caused by a fever of unknown etiology but having symptoms resembling those of yellow fever were reported in the native population of an area in Panama not far from where *H. boshelli* was found.

RABIES

KIRSCHE, P. La rage humaine au Nord Viet-Nam en 1955. [**Human Rabies in Northern Vietnam in 1955**] *Ann. Inst. Pasteur.* 1957, July, v. 93, No. 1, 135–8.

In Northern Vietnam 41 persons suffering from rabies presented themselves for examination at the Institute in 1955; all 41 died 2–4 days after examination. During the same year 102 further cases were reported in the territory; these occurred in persons bitten by, or otherwise in contact with, the same animals (dogs) as the 41 referred to above; in these cases diagnosis was made by various local medical practitioners, with much experience of the disease.

A clinical study of those cases for which reliable data were available showed that all were of the excited or furious form; onset was characterized by a sharp rise in temperature, sometimes of the pseudo-malarial type, and by a tingling in the vicinity of the wound; high fever lasted 2 days and defervescence was accompanied by excessive perspiration; duration of illness was usually 5–6 days, rarely less than 4; and incubation periods were, in general, shorter than those observed after dog bites in most other countries, probably because of the fact that virus of the exalted type, with high invasive power, is not uncommon in Northern Vietnam.

The many deaths reported by the Institute do not constitute a reflection on the specific treatment administered there; in most cases the bitten person arrived far too late for treatment to be successful, *i.e.*, more than 30 days after the time of wounding. Since the end of 1955 persons with severe wounds, particularly those with face wounds, have received, in addition to the ordinary course of phenolized vaccine, a preliminary injection of 40 ml. of hyperimmune serum, together with 150 units of hyaluronidase.

In Northern Vietnam rabies is endemic, the dog being the transmitter of the virus to man. Although from the public health standpoint rabies in no way compares with such other endemic diseases as malaria and tuberculosis in taking toll of human life, it nevertheless constitutes a

serious problem, entailing for the treatment of bitten persons heavy public and private expenditure. Solution of the problem may, it is felt, best be found in the adoption of those general control measures, which have proved so successful in other countries, *viz.*, control over the movement of dogs and their compulsory vaccination. *G. Stuart*

VAN DEN ENDE, M., POLSON, A. & TURNER, G. S. **Experiments with the Soluble Antigen of Rabies in Suckling Mouse Brains.** *J. Hygiene.* 1957, Sept., v. 55, No. 3, 361–73. [11 refs.]

A 20% suspension in M/7·5 *p*H 8·2 phosphate buffer of the brains of infant mice infected with the Flury strain of rabies virus was clarified by low-speed centrifugation and freed from virus by high-speed centrifugation. Complement-fixation tests with mouse immune serum carried out at various stages during the preparation showed that the complement-fixing (soluble) antigen could be separated from particulate virus and remained in the final supernatant. In preparations made at intervals after infection the rise in infectivity preceded the rise in complement-fixing activity, possibly on account of the greater sensitivity of the infectivity titration. The soluble antigen was stable between *p*H 6 and 12 when exposed for 20 hours at 0–37°C., but when dialysed against *p*H 4·3 citrate buffer it was precipitated, and only one-fifth to one-half of the activity could be subsequently recovered; the activity was reduced by one-third to one-half by digestion with trypsin and nucleases, but withstood heating at 56°C. for 30 minutes. Specific complement-fixing antibody was found in titres up to 1,920 in rabbits immunized with soluble antigen which had been freed from infective virus by heating, but no neutralizing antibody was formed. In experiments with mice, soluble antigen inactivated with phenol also produced neutralizing antibody, although this may have been due to the presence of infective virus.

D. J. Bauer

HABEL, K. **Rabies Prophylaxis in Man.** *Pub. Health Rep.* Wash. 1957, Aug., v. 72, No. 8, 667–73, 2 figs. [12 refs.]

In this paper, presented at the annual meeting of the American Public Health Association in November 1956, Dr. Habel reviews the development of experimental studies on rabies prophylaxis and their application to man. In general, research has developed along 2 lines: (1) improving the effectiveness of prophylaxis, (2) reducing the severity of reactions to rabies vaccine, especially those of the dangerous neurological type.

The author summarizes, in tables and graphs, the result of 2 studies by the WHO Expert Committee on Rabies, with which readers of this *Bulletin* will be familiar [this *Bulletin*, 1956, v. 53, 434, 435, 1420], and the recommendation by the WHO Committee of the routine use of a single dose of antiserum followed by at least 14 doses of vaccine for all

severe exposures [*ibid.*, 1957, v. 54, 809]. Dr. Habel adds two further practical points, namely (1) experimental results (as yet untested in the field) indicate that local infiltration of part of the total dose of antiserum about the bite wound increases its effectiveness, (2) the antiserum at present available commercially in the United States is a concentrated horse serum; hence sensitivity tests must be performed before its use. Serum sickness may be expected in 5 to 20% of treated persons.

The question of vaccination schedules is next discussed, with reference to the relatively large number of doses of vaccine required and to the dangerous reactions which may follow. Experimental studies are referred to which suggest that the number of doses of vaccine may be reduced by proper spacing without any marked reduction in effectiveness [*ibid.*, 1956, v. 53, 1421]. Attempts to eliminate severe neurological reactions to rabies virus have stimulated research with vaccines produced from avian embryos [*ibid.*, 1955, v. 52, 970].

The author concludes that " . . . by far the most significant recent accomplishment in the field of rabies prophylaxis in man has been the further development of rabies antiserum and the demonstration in a clinical trial of its superior efficacy when combined with vaccine ".

[For a previous review by Dr. Habel see *ibid.*, 1957, v. 54, 1180.]

H. J. O'D. Burke-Gaffney

LAUDE, T. & VAUCK, I. Bericht über die Tätigkeit der Wutschutz-Abteilung des Robert Koch-Institutes, Berlin, für das Jahr 1950. [**Report of the Activities of the Rabies Protection Department of the Robert Koch Institute, Berlin, in 1950**] *Zent. f. Bakt.* I. Abt. Orig. 1957, v. 169, Nos. 5/6, 349–57.

The English summary appended to the paper is as follows:—

" The rabies protection department was consulted in 1950 by 2342 persons. This report gives exact details on the patients in the groups A-D_1 (kind of possible infection, source of infection, origin, etc.) and on the compatibility of the vaccination methods applied. In the year 1950 the rabies protection department recorded a total of 13 deaths caused by Lyssa. Of these, 5 cases received complete rabies protection treatment, 8 were not inoculated. The progress of illness of the different cases is treated."

ANDRAL, L. & SÉRIÉ, C., with the technical collaboration of A. GENTILE. Études expérimentales sur la rage en Ethiopie. [**Experimental Studies on Rabies in Ethiopia**] *Ann. Inst. Pasteur.* 1957, Oct., v. 93, No. 4, 475–88.

The English summary appended to the paper is as follows:—

" The experimental data obtained by the authors demonstrate that in countries where rabies is endemic:

"1. There exists a high percentage of apparently healthy dogs (35%) which present a marked increase of the α_2-globulins.

"2. A few of these animals present atypical forms of rabies.

"3. The existence of virus carrying and virus excreting dogs is demonstrated."

[See this *Bulletin*, 1955, v. 52, 969.]

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

BRYGOO, E. R. Liste chronologique des publications concernant la peste et le bacille de Yersin à Madagascar de 1900 à 1954 inclus. [**Chronological List of Publications on Plague and the Plague Bacillus in Madagascar from 1900 to 1954**] *Arch. Inst. Pasteur de Madagascar.* 1956, 33–44.

MEYER, K. F. **The Natural History of Plague and Psittacosis.** *Pub. Health Rep.* Wash. 1957, Aug., v. 72, No. 8, 705–19. [21 refs.]

The author has been happy in his choice of the subjects and subject-matter of this lecture in honour of R. E. DYER. Having made a special study of the two diseases discussed he is exceptionally well qualified to select the information most likely to be useful to his audience and readers.

Those wishing for a refresher course on recent advances in knowledge of plague and psittacosis cannot do better than read this paper; in an abstract it is only practicable to give a few samples of its contents. The author begins by warning against the indiscriminate and excessive use of antibacterial drugs in the treatment of plague. This practice is regarded as doing great harm by causing a steady increase in the number of failures, of toxic reactions, of sensitized patients and of resistant bacteria. Stress is laid on the importance of the natural tendency of bacterial cells to undergo mutations which are transmissible by heredity and therefore are likely to be responsible for causing the great cyclic variations which occur in them through the centuries. An example is the increasing infectivity observed in them during the early stages of epidemics when conditions are favourable to them in their hosts, whereas in the later stages when the number of available hosts becomes reduced there is a tendency to lowered activity of the parasites and to the establishment of a balance between host and parasite so that they come to live together without causing much damage to each other. These

quiescent periods tend to be long; the epidemic periods are relatively short and explosive.

A short description is given of plague in San Francisco and the western sea-board of California. In the urban-murine phase in San Francisco from 1901 to 1908 there were 159 known cases and 77 deaths. This was followed by the discovery of a reservoir of infection among wild rodents, but few of these animals were available for study and by 1914 optimistic observers believed that plague had been eradicated from the area. From 1915, however, occasional infections were reported among squirrels in the neighbourhood of San Francisco and suddenly there was an alarming outbreak of pneumonic plague in Oakland in which 13 persons died within 4 weeks from mid August, 1919. The first patient had been attacked by bubonic plague after an excursion for squirrel shooting in hilly country: his bubo was incised and afterwards he developed pneumonic plague. The other patients became infected after direct contact with him or with persons infected by him.

Another outbreak occurred in October and November 1924, at Los Angeles; there were 40 cases of which 29 were pneumonic, 8 were bubonic and in 3 the infection entered through the tonsils. This outbreak was believed to have originated from bubonic plague transmitted by rat fleas. Infected squirrels were found in the urban section of the city and squirrel fleas were found on the rats. Such interchanges of fleas between wild rodents and rats commensal with man had been observed both before and after this incident. It is known that in countries where the principal reservoirs of plague infection are in squirrels and gerbils plague may occur among commensal rats without causing "notable repercussions in nearby human populations". Up to 1940 workers on the spot believed that foci of infection among wild rodents in South America occurred only in Argentina, but since that time such foci have been found in Venezuela, Bolivia, Peru and Ecuador.

In 1952 Baltazard *et al.* [this *Bulletin*, 1952, v. 49, 1041] discovered the presence of infection among three species of wild rats in Kurdistan. In 1956 Heisch [*ibid.*, 1957, v. 54, 232] in Kenya reported the presence of infection among three species of wild mice, and recently in India foci have been found among wild rodents, especially bandicoots. Baltazard believes that the maintenance of persisting foci requires the presence, not only of resistant wild rodents capable of surviving epizootics of plague, but also of susceptible rodents capable of rekindling the infection; his view of the part played by the rat in the natural history of plague is expressed as follows: "if the rat has made the fortune of plague, it is not the original, probably not even the actual, proprietor of the disease, but only the disseminator".

The author agrees with the view that human plague consists of only two main types, bubonic and pulmonary; he regards septicaemic plague as merely a highly virulent form of the bubonic type in which the bacteria have overrun the lymph nodes and invaded the blood stream before the

buboes have had time to develop. He therefore proposes a classification of plague in man as (1) the primary bubonic or zootic type and (2) the primary pulmonary or demic type.

[Presumably the word "zootic" in the above classification is used to mean transmitted from a lower animal and the word "demic" to mean transmitted from man. Objection may be raised to the use of the words zootic and demic in this sense. By analogy with the words enzootic, epizootic, endemic, epidemic and pandemic a zootic disease would be one affecting lower animals and a demic disease would be one affecting human beings.]

The modern experimental work on the mode of transmission of pneumonic plague is briefly described. The section on chemotherapy of the disease consists chiefly of warnings against reliance on excessive doses of antimicrobial drugs, though it is claimed that with early treatment with antibiotics any case of uncomplicated plague should be readily curable. Mention is made of the spectacular effects obtained in Madagascar where pneumonic plague was cured by chloramphenicol and the tetracycline drugs.

In the section of the paper dealing with psittacosis the author is equally successful in presenting a clear picture of modern developments in knowledge of the disease, which is now known to occur as a common mild enzootic infection among many kinds of wild and domestic birds in addition to the psittacines. The most familiar kind of infection is in parakeet-breeding aviaries in which as many as 5–10% of the birds may die in epizootics of the disease and latent infection is relatively common. Control of the infection is now quite easy by feeding the birds on food grains impregnated with suitable doses of one of the tetracyclines.

In pigeons, chickens, ducks and turkeys the disease has become relatively important in the U.S.A. where infections among poultry workers made up 398 of the 1,687 cases in the past 5 years. No mention is made of the number of deaths. Explosive outbreaks of human infection have been reported among the people employed in processing-plants of turkey farms in the U.S.A. *John W. D. Megaw*

MACCHIAVELLO, A. Estudios sobre peste selvática en América del Sur. II. Peste selvática en la región fronteriza del Perú y Ecuador. 2. El foco de peste selvática del Distrito de Lancones, Departamento de Piura, Perú. [**Studies of Silvatic (Wild-Rodent) Plague in South America. II. Silvatic Plague in the Frontier Region between Peru and Ecuador. (2) The Silvatic Plague Focus of the District of Lancones in the Department of Piura, Peru**] *Bol. Oficina Sanitaria Panamericana.* 1957, Sept., v. 43, No. 3, 225–50, 4 figs. [28 refs.]

Although the investigation described in this paper was carried out as long ago as 1946, it is still well worth publication as an exceptionally

instructive report of a study of the transmission of plague from rodents of the wilds to persons who came into close contact with them.

In a recent article [this *Bulletin*, 1957, v. 54, 1407] the author has stated his reasons for concluding that the plague occurring in the province of Loja, Ecuador, was primarily silvatic in type, though in some of the more highly populated areas the commensal rats might acquire infection from the wild rodents and so become reservoirs of infection from which the inhabitants could become infected. In the present paper he describes an investigation carried out under his direction into this problem of silvatic, or wild-rodent, plague by a team of workers belonging to the Anti-Plague Service of Peru.

In June 1946 there were reports of the occurrence of plague in the zone in the north of Peru adjoining the Peru-Ecuador frontier. The survey was carried out in the months July to October of the same year in Lancones, Peru, adjoining the frontier with Ecuador. Till the present enquiry there had been no suspicion of the occurrence of wild-rodent plague in Peru.

The localities investigated consist of ranges of hills which seldom exceed an altitude of 600 metres and which are separated from each other by river beds, most of which are dry except during the rainy season (November to April or May) when they are occupied by torrents. The slopes and summits of the hills are covered with scrub or forest except for clearings on which crops, mostly of maize, are grown. These areas are not inhabited except during the seasons of planting and harvesting the maize when the labourers leave their homes and camp out in temporary huts in the fields of maize.

In Lancones 20 cases of bubonic plague occurred: 3 in May, 8 in June, 5 in July, 2 in August and 2 in September. The other epidemiological conditions prevailing were as follows. Not a single specimen of any species of *Rattus* was found, though there were many mice, *Mus musculus*. The only specimen of *Xenopsylla cheopis* that was found appeared to have been imported to the area with the baggage of the research workers themselves. *Pulex irritans* was fairly common. The attacks were sporadic; only once did 2 cases occur in members of the same household. Infection nearly always occurred while the patients were working in the cultivated fields, usually of maize. At least 6 of the patients had seen dead rodents in, or near, the maize fields. Other patients had noticed that there were many squirrels, but had not observed any evidence of the occurrence of epizootics among them.

The author himself found clear evidence of the occurrence of epizootics among the rodents of the wilds in several places; the usual signs were the presence of corpses or skeletons of squirrels or hamsters. Among 51 squirrels examined 14 were found infected with plague. Infection was relatively far less common among the cricetinae than among the squirrels, probably because the former were much more susceptible and so died quickly and were promptly devoured by birds of prey. The only ecto-

parasites of rodents that were tested for plague were the fleas, *Polygenis litargus*; one lot of 3 of these, collected from squirrels, proved positive by subcutaneous inoculation into guineapigs; another lot of 14 collected from an abandoned nest which had been kept under observation for the previous 6 months were found positive. This prolonged persistence of infectivity under these conditions goes to explain the maintenance of the disease in inter-epizootic periods. Infection was experimentally transmitted by *P. litargus* from guineapig to guineapig and from squirrel to squirrel.

During the months May–July of the same year 8 cases of bubonic plague occurred in Cajadores, Ecuador, in very similar conditions. Only 2 of these were tested bacteriologically and both were positive. There was 1 death. The area affected is just over the frontier between southern Ecuador and northern Peru.

The ages of the 20 patients in Peru were: 12–26 (16); 3 years (2); not stated (2). *Pasteurella pestis* was detected in the buboes of all the 8 patients who were examined.

The outbreak now described in Lancones in Peru and the one previously described in Loja, southern Ecuador [see *ibid.*, 1957, v. 54, 1407] conform in all their essential features with characteristic outbreaks of plague of wild rodents.

The mammalian reservoir of infection of the plague seen in Lancones and Cazaderos is believed to be the squirrel, *Sciurus stramineus nebouxi* and the transmitting vector is *Polygenis litargus*; by these plague is maintained in enzootic form, but when transmitted to hamsters it can assume epizootic proportions because these cricetinae are exceedingly susceptible to infection and therefore are not suitable for acting as reservoirs; their fleas, however, can transmit infection to squirrels and being highly resistant to atmospheric conditions can survive so long that they may serve as reservoirs as well as vectors.

The disease in Lancones is an example of wild-rodent plague, pure and simple; neither the *Rattus* nor *X. cheopis* has been found so that conditions are not suitable for the transfer of the disease to commensal rodents and thereby cause murine plague. *John W. D. Megaw*

ENGLESBERG, E. **Physiological Basis for Rhamnose Utilization by a Mutant of *Pasteurella pestis*. I. Experiments with Resting Cells; the Isolation of Lactic Aldehyde.** *J. Bacteriology.* 1957. July, v. 74, No. 1, 8–11, 2 figs. [11 refs.]

"Mutation to rhamnose utilization in *Pasteurella pestis* leads only to a gain in potentiality on the part of the mutant (R+) to oxidize rhamnose. This potentiality was expressed when the R+ mutant was grown in the presence of rhamnose. The oxidation of rhamnose was incomplete and small amounts of lactic aldehyde were isolated."

ENGLESBERG, E. **Physiological Basis for Rhamnose Utilization by a Mutant of *Pasteurella pestis*. II. A Single Mutational Event leading to the Production of Two Enzymes.** *Arch. Biochemistry.* 1957, Sept., v. 71, No. 1, 179–93, 8 figs. [21 refs.]

BRYGOO, E. R., with the technical collaboration of S. RAJENISON. Virulence pour la souris de trente souches de *Pasteurella pestis* isolées à Tananarive de 1954 à 1956. [**Virulence for Mice of 30 Strains of *Pasteurella pestis* Isolated in Tananarive, Madagascar, between 1954 and 1956**] *Arch. Inst. Pasteur de Madagascar.* 1956, 25–8.

Titrations were performed on 30 strains of *Pasteurella pestis* (3rd subcultures on agar or in broth) to ascertain the numbers of viable organisms needed to produce 100% mortality when inoculated into mice (3 to 5 mice for each dilution of bacterial suspension). With one series of 18 strains grown on agar (2 to 7 days), suspended in physiological saline and inoculated subcutaneously, the dose giving 100% mortality was less than 40 viable organisms for 8 strains, between 200 and 4,000 for 9 strains, and between 20,000 and 40,000 for 1 strain. A second series of 12 strains was grown in broth (1 to 5 days) and inoculated intraperitoneally. Here, 100% mortality was obtained with less than 100 viable organisms from 11 strains and between 100 and 999 organisms from 1 strain. From the combined results, more than 60% (19 out of 30) of the strains killed 100% of mice in doses of less than 100 organisms.

R. S. F. Hennessey

MILES, V. I., KINNEY, A. R. & STARK, H. E. **Flea-Host Relationships of Associated *Rattus* and Native Wild Rodents in the San Francisco Bay Area of California, with special reference to Plague.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 752–60. [20 refs.]

The authors have attempted to determine the degree of commingling of wild and commensal rodents and the incidence of their respective flea species by analysing the results of the trapping of small mammals from March 1953 to April 1954 in 15 areas near San Francisco. The host relationships of 15 species of fleas from 7 principal small mammals are summarized in a table.

The records confirm the findings of other workers that flea exchange involving ground squirrels is infrequent; but the frequency of flea exchange between the smaller rodents, and between them and commensal rats, suggests a potential importance of the local field mice in plague epidemiology. Of particular concern is the flea exchange between *Microtus californicus* and *Rattus norvegicus*. *Microtus* was evidently the principal source of the flea *Malaraeus telchinum* found on *Rattus* and

there was evidence of the transfer of the rat flea *Nosopsyllus fasciatus*. The flea *Catallagia wymani* may also be important because of its wide range of hosts. These 3 fleas were found on all the principal mammals and *C. wymani* was found on all 3 species of *Rattus*.

Out of a total of 37 *Xenopsylla cheopis*, found in only 3 of the areas. 35 were from *Rattus norvegicus* (30 from 10 rats), 1 was from *Mus musculus* and 1 was from *Microtus californicus*.

The plague bacillus was isolated from 4 pools of fleas from 1 area. This led to weekly trapping and revealed a plague epizootic which reached a *Rattus norvegicus* population. Details of this work will be published later. *H. S. Leeson*

STARK, H. E. & KARTMAN, L. **Studies on *Pasteurella pestis* in Fleas. VI. The Laboratory Culture of *Xenopsylla vexabilis hawaiiensis* Jordan, 1932.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 707–11.

"Large numbers of *Xenopsylla vexabilis hawaiiensis* were needed to carry out tests of its efficiency as a plague vector. Efficient culture of the Hawaiian flea was accomplished in white enamelled buckets containing a housed host rat together with a larval substrate consisting of sand and powdered dog pellets (Friskies). The pupae were kept at a temperature of from 23° to 27°C. and a relative humidity of from 93 per cent to 100 per cent. These conditions differed from those required by *Xenopsylla cheopis*, which was maintained separately at lower temperature and humidity. The pupae were sifted from the sand approximately every 3 weeks for maximum production.

"In nature, *X. v. hawaiiensis* was found to breed in rat nests which consisted mainly of dried grass leaves. This evidence, together with the results of laboratory culture, suggests that the fleas probably do not breed on the surface of the ground, nor do the larvae require green grass as formerly postulated."

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, actiology, pathology, diagnosis, clinical findings, treatment, control.

DE, S. N., BHATTACHARYA, K. K. & MONDAL, A. **A Study of the Factors in the Spread of Cholera in Calcutta.** *J. Indian Med. Ass.* 1957, June 16, v. 28, No. 12, 514–19. [12 refs.]

"This is a pilot enquiry, a prelude to a projected large-scale investigation into the epidemiological conditions in Calcutta that allow an annual

recurrence of an outbreak of cholera in that city. At the height of the 1956 epidemic [the word is used in its widest sense, since isolated cases of cholera occur throughout the year in Calcutta] 100 patients with bacteriologically-proven cholera, when they had recovered sufficiently to answer questions, were interrogated on a number of points regarding their living conditions and other environmental factors.

Of these 100 patients, 34 had had direct contact with a patient suffering from cholera: 15 were in the same family, 14 had visited a person known to be infected and also had used the same privy, 1 had visited an infected person and used the same water supply, and 4 had visited an infected person only. In 11 cases there had been indirect contact through use of the same privy or water supply [presumably private], or both, as an infected person: these 45 cases constituted group 1. In 41 cases (group 2), the patient had been exposed to common sources of infection: 3 had been to a public feast, and 10 had taken iced drinks, 9 sweets or ice-cream, 10 cut fruit, and 9 fried foods from public vendors. In the remaining 14 cases (group 3) no source of infection could be suggested.

Public latrines were used by 78 of the whole group, 71 obtained their water supply from a hydrant or other public source, and 29 used unfiltered Ganges water for washing purposes.

In the majority of cases in which there was a history of contact, this occurred 2 to 4 days before the onset of the disease; in none was the interval less than 2 days and in the minority it was from 5 to 45 days.

The authors conclude: " In this overcrowded city, early and compulsory notification and hospitalisation of cases are essential requirements to prevent the spread of the epidemic. Convalescents should not be allowed to resume their work particularly when it involves the handling of food and drink until absolutely free from *Vibrio cholerae*. Constant water-supply under adequate pressure, stoppage of the use of Ganges water for domestic purpose, the education of the public regarding the disposal of cholera excreta, sanitary hygiene and inoculation are also necessary ".

[The absence of any control series, or of any general sanitary data such as the percentage of domiciles with private latrines or the percentage of persons dependent on a public source of water supply, make it difficult to appreciate the significance of the figures given, and the conclusions, except possibly the first, are based on general sanitary considerations rather than on any figures that have emerged from this investigation.]

L. E. Napier

MALLIK, K. C. B., MONDOL, A. & GANGULY, N. C. **Fate of Bile Pigment in Cholera.** *Brit. Med. J.* 1957, Oct. 5, 803–5. [16 refs.]

Various explanations have been put forward in the past for the pale colour of the " rice water stools " seen in cholera. [The colour of normal stools is due to the pigment urobilin (or stercobilin) which is formed by

oxidation of the colourless precursor urobilinogen (or stercobilinogen). Urobilinogen is formed from its precursor bilirubin by the action of intestinal bacteria, principally *Escherichia coli*. There are therefore three principal possible causes for the stool not to have its normal brown colour. In obstructive jaundice the stools are pale because the precursor of urobilinogen, bilirubin, does not reach the intestines. In infants or when a patient's gut has been "sterilized by antibiotic treatment bilirubin may be excreted into the intestines but the intestinal flora will not be suitable for converting it into urobilinogen: though the stools will not necessarily be pale, they will look golden yellow and not brown. In sprue the stools pass so speedily through the intestinal canal that there is no time for the urobilinogen to become oxidized. Although in sprue the stools are pale when produced, they will darken on standing, *i.e.*, when time is allowed for the urobilinogen to become oxidized.] It has been suggested that in cholera, oedema of the mucosa of the biliary tract causes a biliary obstruction [ROGERS, this *Bulletin*, 1921, v. 18, 408]. Another explanation for the pallor of the stools in cholera postulates a depression of the secretory function of the liver [DE & CHATTERJEE, *Bull. Hyg.*, 1936, v. 11, 429] with a corresponding retention of bilirubin in the blood plasma. The authors could not confirm these theories. They noted at necropsy of cholera patients who had died in the stage of purging that a gentle pressure on the gall bladder caused an escape of bile into the duodenum.

They investigated 52 cholera patients during the 1956 epidemic in Calcutta. Though they found a slightly raised serum bilirubin level during the stage of haemoconcentration, this was within the upper limit of the normal range (0·81 mgm.%). The Van den Bergh reaction was indirect whereas the direct reaction would have been expected had the bilirubin level been raised because of an extra- or intrahepatic obstruction of the bile flow. The serum alkaline phosphatase level was never higher than 12 King-Armstrong units, whereas it should have been higher in an obstructive "jaundice". Virtually no faecal urobilinogen could be detected in the pale stools. However, the urine contained urobilinogen. This indicated that some bilirubin had reached the intestines and had been converted into urobilinogen which was subsequently absorbed and excreted by the kidneys. Obviously the amount of urobilinogen in the stools had been too small for demonstration by the usual methods.

The authors advance several explanations for their failure to discover urobilinogen in the stools. The amount of liquid stools in a cholera patient may be nearly as much as 6 litres in 24 hours; this would dilute the urobilinogen below a level which can be measured by conventional methods. Not all bilirubin is necessarily converted into urobilinogen. It is known that a variable amount is changed into another compound which does not react with Ehrlich's reagent. Lastly the change in the intestinal flora, particularly in the *Escherichia coli* population, may be responsible for a fall in the urobilinogen production resembling that seen

in patients whose intestinal flora has been changed by treatment with chlortetracycline. *H. Lehmann*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Izzo, G. Considerazioni sull'infezione amebica nella Provincia di Napoli. [**Amoebiasis in the Province of Naples**] *Acta Med. Italica.* 1957, July, v. 12, No. 7, 179–89. [29 refs.]

The author, continuing his investigations into the epidemiology of various diseases in the province of Naples [this *Bulletin*, 1957, v. 54, 1301], describes here the clinico-epidemiological features of amoebiasis in the same area.

He points out that the situation of the city, the relatively unfavourable environmental conditions, and the fact that as a great port it is in contact with many parts of the world, all favour the importation of the disease and its establishment as an indigenous infection, which in the last few years has gradually lost its acute dysenteric aspect and instead presents as a chronic illness with protean manifestations, and is usually sporadic. Pseudotuberculous, dyspeptic, cardio-vascular, anaemic, and neurological forms are mentioned and clinical histories of some of these are given as examples; some of the patients had never been out of the city.

Emetine hydrochloride is favoured for treatment. It is given in 3 courses, with intervals of 50–60 days between each course. If for any reason (*e.g.*, cardiovascular disease) emetine is contra-indicated, tablets of conessine bromide, or iodoquinoline orally or by enema are suggested and in the latter vioform is preferred to Yatren, etc., as it acts also in the tissues. Antibiotics, especially aureomycin and oxytetracycline, are advised as they potentiate the action of emetine. In the very chronic cases a complete round of the various commonly prescribed drugs is necessary with the usual supportive treatment, the whole lasting from 2–3 years.

Figures are given for the years from 1935–55, totalling 25 cases in all, several years having had only 1 case notified. The cases seem to have been distributed fairly evenly throughout the city, and the infection is considered to be due to the consumption of contaminated raw unwashed vegetables. As a contrast to the figures of official notifications, the author gives the results of the examination of the faeces of 3,045 patients attending the Tropical Diseases Clinic in the 2 years 1950–51, where 9·72% were positive, and points out modestly that his epidemiological investigations were not intended to give any idea of the incidence but to

have an orientating value, as the number of notified cases is insignificant compared with those treated in private practice.

[This paper is of interest not only because the disease is regarded as indigenous in Naples, but also from the point of view of current Italian ideas on treatment. Emetine-bismuth-iodide is not mentioned at all, while the emphasis placed on the need for antibiotics to reduce concomitant bacteria is noteworthy. The original paper should be consulted for actual dosages used, and deserves to be read in full.]

W. K. Dunscombe

HILKER, Doris M., SHERMAN, H. J. & WHITE, A. G. C. **Starch Hydrolysis by *Entamoeba histolytica*.** *Exper. Parasit.* New York. 1957. Sept., v. 6, No. 5, 459–64, 1 fig. [16 refs.]

"A study of the amylase activity of three strains of *Entamoeba histolytica* and two reptilian species has been made. Chromatographic studies showed the presence of amylase and maltase but not sucrase or lactase in lyophilized amebal preparations. Factors involved in the utilization of starch by the amebae are discussed."

DE BLASI, R. & RICCIARDI, M. L. Studi sulla biologia di *E. histolytica*. II) Osservazioni sul fenomeno dell'incistamento e studio comparativo di vari metodi per ottenerlo *in vitro*. [**Studies on the Biology of *E. histolytica*. II. Observations on Encystment and Comparative Study of Methods of producing it** *in vitro*] *Nuovi Ann. d'Igiene e Microbiol.* 1957, Mar.–Apr., v. 8, No. 2, 138–51. [13 refs.] English summary (7 lines).

The authors first review various methods for inducing encystation of *Entamoeba histolytica* in cultures, as described in the literature. In their opinion, the most satisfactory of these are Dobell and Laidlaw's, Zuckerman and Meleney's and Balamuth's methods. The present experiments were accordingly restricted to these methods, which were used to induce encystation in 7 strains grown *in vitro* in association with 1 to 3 bacterial species. The results were assessed by counts of the cysts produced in various media, by microscopical examination of the cysts to determine their maturity, and by cultivation. The greatest number of cysts was obtained by Zuckerman and Meleney's method, for which the following procedure was used. The amoebae were first adapted to growth without rice starch in Cleveland and Sander's medium, after which the culture was transferred to 50 cc. of Zuckerman and Meleney's "Cerophyl-Proteose-Ringer" medium, to which 0·02 gm. rice starch and 5 cc. horse serum were added; after partial reduction of pressure in the flask, the culture was grown for 72 hours at 37°C. When the cysts were fully

developed, the medium was centrifuged and the cysts were harvested from the sediment. *C. A. Hoare*

CONNER, Phyllis, ROSENTHAL, Gladys & SHAFFER, J. G. **Note on the Transfer of Strains of *Entamoeba histolytica* from One Bacterial Flora to Another.** *Amer. J. Trop. Med. & Hyg.* 1957, Mar., v. 6, No. 2, 225–6.

In attempting to transfer the bacterial flora of a strain of *Entamoeba histolytica*, grown in diphasic medium, by removal of a loopful from the top of the fluid overlay, the authors discovered that amoebae also developed in the subculture. A number of experiments were then carried out with cultures of 6 other strains of *E. histolytica*, with similar results in all but one strain which represented the small race. Amoebae were transferred in this manner in from 39% to 83% of subcultures, and trophozoites could also be detected in the inocula microscopically.

It is suggested that the amoebae are carried from the bottom of the culture (where they usually grow) to the top either by convection currents or by bubbles of gas elaborated by the bacteria. *C. A. Hoare*

MELENEY, H. E. **Some Unsolved Problems in Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 487–98. [Numerous refs.]

Meleney, from a long personal experience of amoebiasis in all its aspects, discusses a number of fundamental problems concerning the condition to which we do not at present have an answer. These problems may be listed as biological, diagnostic, and epidemiological.

The biological problems start with the reason for division of the nucleus, or multiplication of the parasite. The factor stimulating this, on the basis of our present knowledge, seems most likely to be an enzyme provided by cellular metabolism. The amoeba has not so far been successfully maintained in the absence of multiplying cells. The reason for the production of cytolytic toxin by the parasite, and its nature, also so far are not known. This toxin is the pathogenic component of *Entamoeba histolytica*, and the possession of it differentiates it from the purely commensal allied amoebae. The matter of commensal existence of *E. histolytica* is yet another unsolved problem; current opinion inclines to the belief that it is not an obligatory tissue parasite. Tissue invasion by the parasite, when it occurs, is the reason for its great importance; but what governs this, and the extent to which it occurs, is still a matter for speculation.

The diagnostic problems include first and foremost the provision of suitable faecal specimens and their competent examination by a

thoroughly skilled and continuously practising staff. The results of proctoscopic and sigmoidoscopic examinations must be accepted with caution. The "over-diagnosis" of amoebiasis by clinical methods supported by faulty microscopy is a problem indeed difficult to resolve. Unfortunately the available serological tests for diagnosis are inaccurate.

The epidemiological problems are great, when the prevalence of this infection among all peoples of the world is considered. The cause of all infections is faecal contamination directly, or indirectly as by flies. The primary requisite therefore is proper sanitation. In the last 21 years the incidence of the infection in a rural community in the U.S.A. has very materially fallen as a result of betterment in the standards of living, and improvement in the sanitary standards [this *Bulletin*, 1954, v. 51, 921].

A. R. D. Adams

MOAN, Jeanne C. **The Serological Diagnosis of Amebiasis by means of the Precipitin Test.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 499–513, 5 figs. on pl.

Since CRAIG [see this *Bulletin*, 1928, v. 25, 228, 623] showed that the sera of patients harbouring *Entamoeba histolytica* contain complement-fixing antibodies many others have investigated this matter. There is a real need for a specific and sensitive serological test for this infection. The author has devised a precipitation test which she believes adequately to fulfil the need.

The antigen is a water-clear standardized solution prepared from a heavy and healthy growth of *E. histolytica* on a special buffered liver concentrate medium. It is free from human bacteria; the necessary bacterial concomitant in the culture is obtained from cultures of *E. terrapinae*. A packed concentrate of amoebae from suitable heavy sub-cultures is frozen at −10°C. for 24 hours to rupture the parasites; it is then spun at 12,000 r.p.m. after the addition of some fluid. The resultant clear supernatant fluid is the antigen; it is used after standardization against a standard antigen and a stock serum.

The test requires only 0·5 ml. of serum; this is cleared by centrifugation at 2,000 r.p.m. and inactivated at 56°C. for 30 minutes. The antigen is incubated at 37°C. for 15 minutes, and then 0·05 ml. [a drop] is added to an equal volume of serum on a ringed slide. After thorough mixing by rotation the test is read microscopically. There are photographs of the degrees of resultant precipitation as determined by this means. The results are graded from negative to + + + + positive.

The precipitation test has shown a high degree of specificity for the 2,400 sera on which it has been tried; false positive results were virtually absent when only fresh and clear sera were used. False negative results were few. The heaviest precipitates are seen in those patients who are most ill; after successful specific treatment the test becomes negative

within a few weeks. Specific treatment may at times cause a temporarily increased positivity of the test, due probably to the antigenic stimulus of the death of many amoebae in the body tissues; this is regarded as a diagnostic confirmation. About 50% of asymptomatic carriers of the infection give a negative test. Serological results even in cases of clinical dysentery are unpredictable in the early stage, but in the late stages the test is almost always positive. The precipitation test described is a simple and rapid one for the detection of significant clinical infections with *E. histolytica*. It may require more elaboration, and more extended experience of it is desirable before its value can be fully established.

A. R. D. Adams

CHATTERJEE, S. C., BISWAS, S. K., GHOSH, J. C. & BANERJEE, S. T. **Clinical Trial of a New Anti-Amoebic Drug.** *J. Indian Med. Ass.* 1957, Sept. 1, v. 29, No. 5, 183–5.

"Camoform, a new synthetic organic compound, was tried in six cases of active colonic amoebiasis with fairly satisfactory results. The drug is practically without any toxic effect, and effective orally. At present it is fairly costly, and a single course of therapy consisting of a dose of 40 mg. per kg. of body weight daily for 7 days seems to be more effective."

[See this *Bulletin*, 1957, v. 54, 44, 821.]

SARIN, L. R. & DASGUPTA, A. **Diethylaminocresol Dihydrochloride in Amoebiasis.** *J. Indian Med. Ass.* 1957, Sept. 1, v. 29, No. 5, 186–7.

"Results of treatment of twenty cases of amoebiasis treated with 750 mg. of camoform a day for 7 days are given. Of these, 3 cases of acute amoebic colitis responded well. Out of 17 chronic cases 12 showed some improvement. The drug failed to have any effect on 5 cases.

"Severe side reactions in the nature of pruritus and maculopapular dermatitis were noted."

HOARE, C. A. **Classification of Coccidia eimeriidae in a "Periodic System" of Homologous Genera.** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Jan., v. 8, No. 1, 197–202, 1 diagram.

In 1933 the author proposed a classification of the coccidia (Eimeriidae) based on the character of the oöcyst (*Parasitology*, 1933, v. 25, 359) and he now expands this into a periodic system, probably unique in the Protozoa in its logical form, based on phylogeny, and whereby the existence of new genera with particular characters can be accurately forecast. The quantitative differences (number of spores and sporozoites) provide

criteria for genera, while qualitative characters seem to differentiate species.

Classification of Genera of Eimeriidae in Homologous Series

A diagram shows clearly the position today; the vertical groups represent genera with identical numbers of sporozoites, while the horizontal show the genera with identical numbers of sporocysts (*i.e.*, spores). The bottom line is independent of the remainder. It will be noted that 6 places remain vacant for new genera. *P. C. C. Garnham*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BABUDIERI, B. **Relapsing Fever in Jordan.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 5, 911–28, 5 figs. [10 refs.]

The author, in 1954, as WHO consultant, carried out a survey on relapsing fever in Jordan, especially on the method of infection and the most effective prophylactic measures.

The disease would seem to have existed in Jordan for centuries but its method of transmission has remained uncertain, although up to the end of 1953 all cases were recorded as louse-borne. As a matter of fact this type did spread through Jordan in 1916–20 at the time of the great epidemic which swept through North Africa, and a second outbreak occurred in 1945–46, since when the disease has appeared only endemically. The author was able to observe 22 cases of relapsing fever during his visit and none could be considered a louse-borne case and the great majority could be proved to be tick-borne. *Ornithodorus tholozani* lives in caves in the hilly areas and is widely distributed. Spirochaetal infection was demonstrated in them by feeding on mice and this species is considered to be the usual carrier in the country districts, but in the towns, in particular Nablus and Marda, *Ornithodorus coniceps* is a possible carrier and in one experiment produced infection in mice.

The spread of the disease could be arrested by adequate tick-control and certain insecticides were tested on the larvae of *O. tholozani*. From a very few experiments Diazinon and malathion were found to be the most toxic, but Gammexane and dieldrin seem preferable as they remain toxic longer than the other compounds tested.

Arsenobenzol compounds and penicillin were ineffective in the treatment of patients but good results were obtained with aureomycin and oxytetracycline. *Edward Hindle*

RANQUE, J., DEPIEDS, R. & FAURE, A. Essais sur la survie de *Borrelia hispanica* en sérum dilué. [**Studies on the Survival of** *Spirochaeta hispanica* **in Dilute Serum**] [Miscellanea]. *Acta Tropica.* Basle. 1957, v. 14, No. 3, 218–25.

[See this *Bulletin*, 1956, v. 53, 1428.]

YASUDA, J. **On the Pleomorphism in Sodoku Spirochaete. II. Comparative Study of Optical and Electron Microscopic Findings.** *Med. J. Osaka Univ.* 1957, Mar., v. 7, No. 4, 745–52, 19 figs. on 3 pls. [12 refs.]

"Pleomorphism in the sodoku spirochaete has been confirmed by the electron-microscope. Findings have been given in comparison with those using the optical microscope."

[See this *Bulletin*, 1956, v. 53, (1430).]

YAWS AND OTHER TREPONEMATOSES

YU, Kuang-Yuan. **Frambesia. A Study of 125 Cases.** *Chinese Med. J.* Peking. 1957, Aug., v. 75, No. 8, 616–25, 10 figs. on 3 pls. [25 refs.]

Yaws is intensely endemic in the Kiangsu Province of China, which is traversed by the Grand Canal, a densely populated zone in which a large, literally floating, population lives under extremely poor hygienic conditions. The disease has also been reported from Taiwan, in Shensi Province, even further to the north and from Shanghai on the coast of the East China Sea to Kashgar, which lies to the North of the Hindu Kush range far to the West. It is thus, in China, far from being a tropical disease, since these endemic regions lie between the 30th and 40th degrees of North latitude. [The northern limit of the tropics, the Tropic of Cancer, is at 23.75°N.]

This study comprises 125 cases seen at the Wuhan Medical College, Hankow, the great Yangtse river port centrally situated in Hu-peh Province. It describes 5 primary, 114 secondary but only 6 late or tertiary cases, there being the usual predominance of infective lesions in the first decade of life, a slightly lower proportion in the second decade, with an intermediate proportion in the third decade, presumably due to primary infection or reinfection of mothers by their young children.

The skin lesions encountered included all the classical types, but in the scanty examples of the late or tertiary stage no case of gangosa or goundou was encountered. The paper includes a good account, with illustrations, of the histopathology of the specific skin lesions.

The author has used as a routine treatment intramuscular injections of Acetylarsan or Planarsan in adults, and has found that, for children, oral Stovarsol has given "fairly good results". He advocates a total course of 3–5 gm. of parenteral arsenic for the adult patient. Crystalline penicillin to a total of 3·6–4·8 mega units is reserved for patients intolerant of arsenic or suffering from repeated relapses: some resistant cases showed no reversal of the sero-reactions (length of observation period not stated) despite dosages as high as 9–12 mega units, administered as PAM.

[This review is of value in drawing attention to the wide distribution of yaws in a temperate country.] *J. H. Walters*

BECKER, J. J. T. & HILL, K. R. **Pinta: its possible Presence in British Honduras.** *West Indian Med. J.* 1957, Mar., v. 6, No. 1, 65–6, 2 figs. on pl.

Pinta has been diagnosed at times in British Honduras, but not proved. The authors, during a brief visit there, saw 24 cases thought to be pinta and 14 of them were clinically suggestive of it. Coloured photographs of 6 of these, together with clinical data, were referred to Dr. Gerardo

VARELA of Mexico City. The details are shown in a table. On clinical grounds, Dr. Varela considered 3 of these to be pinta and 1 to be late pinta. In 2 of the 3 in which serological tests for syphilis had been done the result was positive. In none of the 6 were spirochaetes found by dark ground examination.

Dr. Varela has laid down 3 criteria for the definite diagnosis of pinta, namely (1) clinical appearance, (2) positive serological test for syphilis, (3) demonstration of spirochaetes. The last is "not too frequently" found even in clinically classical cases.

Although the 3 criteria have not been established in any of these cases, it appears on clinical and serological grounds that pinta may be present in the area (Stann Creek) of British Honduras in which the study was made. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

GALEA, J. & BONNICI, E. **Leprosy in Malta.** *Leprosy Review.* 1957, Oct., v. 28, No. 4, 139–47, 2 figs. on pl.

The history of leprosy in Malta is traced, and former and more recent methods of control are discussed. It is supposed that leprosy was first introduced by the Saracens during their domination from 870 to 1090 A.D.; that its incidence was increased by the return of emigrants from N. Africa who had gone there during a time of economic depression in Malta; that it was further supplemented by the stationing of 6,000 Indian troops in the island during the Russo-Turkish war in 1878.

In 1659 the disease had become so common that the Grand Master of the Order of Malta appointed a commission to provide for the victims. In 1883 compulsory segregation was recommended, but was not carried out till 10 years later. A leprosarium was completed between 1900 and 1912, where male and, later, female patients were accommodated. An amendment to the original Leprosy Ordinance was published in 1919 under which patients in whom the disease had become arrested could be discharged, and in 1929 it was arranged that non-infectious patients could be treated outside.

In 1913 the incidence index was 0·54 per thousand, and in 1930 it was 0·34, but the latter figure did not include patients on parole, or those who were considered non-infectious. The total number registered in 1956 was 144 (0·45 per thousand). The lepromatous rate was 66%, and the child rate in 534 cases notified since 1920 was 3%.

The system of compulsory segregation is now abandoned as it led to seclusion and spreading of infection. It is hoped that with the new treatment patients will come forward earlier, and that the spread of infection will be less liable to take place. *Ernest Muir*

UTKU, E. Türkiye' de lepra. [**Leprosy in Turkey**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1957, v. 17, Nos. 1/2, 26–32, 1 map. [10 refs.] French summary.

As a preliminary step in organizing modern methods of leprosy control in Turkey an attempt was made to discover the topographical incidence of the disease. Previous studies by individual authors had shown, for example, 1,383 reported cases between 1927 and 1954, but suggested that the real incidence was probably 8 to 10 times greater. COCHRANE in 1953, during a visit to Eastern Turkey, estimated that there were 6,000–12,000 cases. Statistics from the Turkish army indicated that 50 cases per 1,000 were found among recruits aged 20 years; these figures, together with the State statistics, enabled the author to calculate that the minimum number of cases of leprosy in Turkey is about 14,000.

A map indicates that endemic regions exist in the east, south-east and in some central and northern areas; around the endemic region there are endemo-sporadic areas; elsewhere only sporadic cases are found.

The author emphasizes the difficulty of detecting cases, particularly as compulsory isolation is in force. The figures which he gives are approximate and were obtained over 4 years in very difficult conditions. *H. J. O'D. Burke-Gaffney*

MORÁN ORDOÑEZ, I. Algunos aspectos epidemiológicos de la lepra en el estado de Guanajuato. [**Some Epidemiological Aspects of Leprosy in the State of Guanajuato**] *Bol. Epidemiológico.* Mexico. 1956, Oct.–Nov.–Dec., v. 20, No. 4, 149–54, 1 graph.

In this State in Central Mexico, with a population rising to over one and a third million, a leprosy census has been maintained since 1930. The total number of cases registered up to 1954 was 2,203, and in 1955 and 1956 there were 215 fresh cases. A map shows that leprosy is chiefly concentrated in the south of the State. A table shows that the numbers registered in successive periods of 5 years are not diminishing. The highest incidence is in the rural areas and among the agricultural labourers. This fact, and the fact that the middle age of life is most affected, have a derogatory influence on the economy of the State. The author believes that there are many cases which have not yet been registered, as the investigation has not been planned in a systematic and thorough manner throughout the whole region. There is still a tendency for the disease to spread, and it is urgent that an intensified campaign be carried out, especially in the rural areas. *Ernest Muir*

BECHELLI, L. M., QUAGLIATO, R. & NASSIF, S. J. Lepromino-reação em holandeses radicados há 2–3 anos no Brasil e sem contacto conhecido com doentes de lepra. [**The Lepromin Reaction in Dutch Settlers in Brazil of Two or Three Years' Standing and with Known Contact with Leprosy Patients**] *Rev. Brasileira Leprologia.* S. Paulo. 1957, Apr.–June, v. 25, No. 2, 107–25, 1 chart. [31 refs.] English summary.

The reaction to the lepromin test was recorded in recent Dutch immigrants living on a farm in Brazil, and compared with similar reactions in Brazilian children living on the same farm. In the 5 to 9 age-group the Dutch showed 80% negative and the Brazilians 53·16%. In the 10 to 14 age-group the Dutch showed 50 to 60% negative, and the Brazilians 30%. In the Dutch children the Fernandez reaction was negative in 89·82% and in the Brazilians in 87·64%.

Lepromin positivity in the Dutch is supposed to be due to sensitization in those possessing the N factor of Rotberg [see below] by the injection of lepromin; or it may be the result of cross sensitization to the tubercle bacillus. The authors found in the rural areas of Brazil positive lepromin reactions to the extent of 70 to 80%, in spite of the tuberculin test being negative. On the other hand there was no sign of a positive tuberculin test resulting in a positive lepromin test. *Ernest Muir*

ROTBERG, A. Fator "N" de resisténcia à lepra e relações com a reatividade lepromínica e tuberculínica. Valor duvidoso do BCG na imunização antileprosa. [**The "N" Factor in Resistance to Leprosy and its Relationship to the Lepromin and Tuberculin Reactions. The Doubtful Value of BCG in Immunization against Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1957, Apr.–June, v. 25, No. 2, 85–106, 1 chart. [68 refs.] English summary.

The following theory is propounded as best explaining the known facts regarding resistance to leprosy. The great majority of children are born possessing the "N factor" [natural factor], that is potential natural resistance to leprosy, by virtue of which, gradually in the course of a few years, they automatically develop actual resistance. This is shown by their original negative reaction to lepromin becoming strongly positive. This change of potential into actual resistance may, however, be speeded up or intensified or both by infection with tuberculosis, inoculation with BCG and possibly other unknown factors.

On the other hand there is a small minority of children who do not possess at birth this potential immunity, the N factor. It is in consequence impossible for them to develop resistance to leprosy; they are what the author terms "the anergic margin". It is from this small minority that all lepromatous cases are drawn. Infection with tuberculosis or inoculation with BCG does not produce in them more than at best a slightly positive lepromin reaction which does not really indicate

resistance. When subjects belonging to this group are infected with leprosy they do not always necessarily develop the disease; accessory factors, including perhaps tuberculosis, which cause debility may be necessary for leprosy to develop.

BCG inoculation might be of value, however, in patients possessing the N factor by transforming their potential resistance into actual resistance at an earlier stage, before infection with leprosy takes place, so that the initial spread of bacilli through the body would be more limited.

Evidence of "the anergic margin" is found in the fact that there is always a small residue of subjects who, when inoculated with BCG, do not develop a positive lepromin reaction; this residue is very similar in number to the "anergic margin". It is this margin of people without the N factor who are important from a prophylactic view point, as they are the only potential spreaders of infection, and yet it is they who are not affected by BCG inoculation. The value of BCG for controlling leprosy would be substantiated if it could be shown that it produces a larger number of strongly positive lepromin reactions in healthy children than are produced spontaneously without BCG. *Ernest Muir*

André, L. J. & André-Gadras, E. Étude des rapports entre la sicklémie et la lèpre. [**Study of a Relation between Sickling and Leprosy**] *Méd. Trop.* Marseilles. 1957, July–Aug., v. 17, No. 4, 596–9. [12 refs.]

The authors have examined the incidence of the sickle-cell trait in the Mitzic district (Gabon). The inhabitants of this region are racially uniform and belong to the Fang community. There is no trypanosomiasis, and malaria is unimportant. Only leprosy flourishes and affects about one-tenth of the population.

Of 600 people without leprosy, 81 (13·5%) were sickle-cell trait carriers. Of 549 leprosy patients, only 45 (8·1%) were sicklers. This is not a very striking difference but when the authors went further and examined the different types of leprosy in the sicklers and non-sicklers, it was found that the 45 sickle-cell trait carriers with leprosy comprised 2 with lepromatous lesions, 17 with tuberculoid lesions and 26 with indeterminate types of leprosy. The non-sicklers showed a much higher incidence of the malignant form of leprosy. Of 504 of those with leprosy who were non-sicklers, 86 (17·1%) showed the malignant form and 204 (40·6%) the tuberculoid form; 214 had indeterminate types of leprosy. This suggests to the authors that the heterozygous sickler is less liable to suffer from malignant leprosy than the normal homozygote. *H. Lehmann*

Richter, R. & Or, N. Die Lipoide bei Lepra lepromatosa und ihre Beziehungen zur Histotopographie der unspezifischen Esterasen. [**Lipoids in Lepromatous Leprosy and their Relationship to the Histotopography of Non-Specific Esterases**] *Acta Med. Turcica.* 1956, v. 8, Nos. 3/4, 97–112, 12 figs. on 6 pls. [34 refs.]

BERGEL, M. Mecanismo de la actividad antileprótica de las sulfonas. [**Mechanism of the Action of Sulphones in Leprosy**] *Semana Méd.* 1957, July 25, v. 111, No. 4, 164–71, 2 figs. [24 refs.]

After reviewing the history of the sulphones used in the treatment of leprosy, the author compares the action of sulphones with that of amines and sulphamides. As an example of the amines he takes N-N′diphenyl-paraphenylendiamine (DPPD), and shows that it can increase the level of vitamins A and E by its biological antioxidant action. While the action of the sulphamides is bactericidal, bacteriostatic and bacteriolytic, that of the sulphones is none of these. The sulphones act not on the bacilli but on the lepromatous tissue, their functions being to prevent oxidation and polymerization and to cause fixation of fats in the body.

Ernest Muir

DAVISON, A. R. **Injectable Sulphone.** *Leprosy Review.* 1957, Oct., v. 28, No. 4, 148–9.

Avlosulfon Soluble was tried in 10 tuberculoid and 17 lepromatous leprosy patients for periods extending up to 2 years. Of the tuberculoid patients 9 were discharged within 3 to 13 months. Of the lepromatous patients the average bacteriological index dropped from 12·5 to 5·8; as compared with controls on oral sulphone where it dropped from 12·6 to 8·8; on oral sulphone plus isoniazid where it dropped from 14·9 to 9·5; on isoniazid plus streptomycin where it dropped from 12·8 to 8·7; and on Streptohydrazid where it dropped from 12 to 9.

The comment is that "So far as the results are concerned we are satisfied that Avlosulfon Soluble is as good as, if not better than, oral diaminodiphenyl-sulphone (DDS)", but it has the disadvantage that it has to be injected intramuscularly (0·5 rising to 1·5 cc. twice weekly), and many patients become "needle shy"; DDS is therefore preferred for routine use.

Ernest Muir

ORBANEJA, J. G., CONTRERAS, F., SUCH, M., GUILLÉN, J., GARCÍA PÉREZ, A., TARABINI, J., MORÁN, F. & TERENCIO, J. Primeros resultados del tratamiento de la lepra con un nuevo preparado: "Leprosan". [**Preliminary Results of Treatment of Leprosy with a New Preparation "Leprosan"**] *Rev. "Fontilles".* Valencia. 1957, Jan.–June, v. 4, No. 3, 97–101, 10 figs. on 3 pls.

A preliminary account is given of clinical trials with a new product in the treatment of leprosy. The product is called "Leprosan Aue L-3" and is obtained by mixing "aryldisulfuros", the group characteristic of which is S_2. Three groups of lepromatous patients were tested: 11 with nodular lesions, 12 with infiltrated lesions, and 11 with macular lesions. After treatment for 5–6 months 7 of the first group showed gradual

clinical improvement; 5 of the second group showed improvement though this was less marked than in the first group; while the third group showed more irregular results, some of them suffering from neuritis and not presenting themselves for treatment. In 3 patients with neuritis there was more marked improvement with this medication than there had been previously with other forms of treatment. Also some bacteriological improvement was noted. The authors are unable to assess the value of this product from this short period of use, but consider that it is worthy of further trial. The drug was given orally in the form of 3 tablets of 15 mgm. daily, arrived at gradually as indicated by tolerance. In some patients this was gradually increased to 6, 8 or 10 tablets daily.

Ernest Muir

JONQUIERES, E. D. L. Control de las reacciones leprosas tuberculoides con prednisona. Comunicación previa. [**Control of Tuberculoid Leprosy Reaction with Prednisone. A Preliminary Note**] *Semana Méd.* 1957, Aug. 15, v. 111, No. 7, 313–17, 6 figs. [14 refs.] English summary.

The exacerbation or reaction in tuberculoid leprosy has no beneficial result and it is apt to leave scars and permanent nerve injury. It is therefore well to suppress it. The author used prednisone in 4 cases of reacting tuberculoid leprosy and in 1 case of dimorphous leprosy. 5 mgm. was given every 4 hours, and sulphone treatment was continued at the same time. In the 4 tuberculoid patients there was rapid subsidence of reaction within a few days, but there was not the same beneficial result in the dimorphous patient. *Ernest Muir*

JOPLING, W. H. & RIDLEY, D. S. **Lack of Effect of Cortisone on the Negative Lepromin Test.** *Leprosy Review.* 1957, Oct., v. 28, No. 4, 157.

DE ALMEIDA NETO, E. & DE PAULA E SILVA, D. Resultados preliminares do emprêgo da D-4 amino-3 Isoxazolidinone no tratamento de três casos lepromatosos. (Nota prévia.) [**Preliminary Results of Treating 3 Cases of Lepromatous Leprosy with Cycloserine**] *Rev. Brasileira Leprologia.* S. Paulo. 1957, Apr.–June, v. 25, No. 2, 127–30.

The English summary appended to the paper is as follows:—

"A preliminary report is given about Cycloserine in Leprosy. Three lepromatous patients were treated with doses of 500 and 750 mg. a day of Cycloserine during two months. A clinical improvement was noted without lepra reaction, but definitive conclusions must wait a longer time of Cycloserine therapy."

RELVICH, A. L. **Experience with Antigen marianum in the Treatment of Leprosy.** *Leprosy Review.* 1957, Oct., v. 28, No. 4, 150–56.

BLANC claimed that he had converted a negative to a positive lepromin reaction in 70% to 90% of lepromatous patients by injecting *Myco. marianum* [this *Bulletin*, 1956, v. 53, 69]; but he did not say how permanent this conversion was. The author obtained conversions in only 30%, and he was not able to test their permanency.

A controlled experiment was planned in which the *marianum* antigen was given to 55 leprosy patients who still continued on sulphone treatment, while the 59 controls received the sulphone treatment only. 0·1 ml. of the antigen was injected once a month for 6 months, then after a rest of 2 months the injections were resumed. The trial was, however, cut short by the author going on leave, and only 5 to 8 monthly injections were given. "No definite difference was observed in the rate of improvement of patients who received the antigen and sulphones compared with the patients on sulphones alone." The author, however, considers that his trial was rather abortive, and a final evaluation must wait for the results of further trials. *Ernest Muir*

CARAYON, A. & HUET, R. La lèpre nerveuse et ses complications. Point de vue du chirurgien, à propos de 40 observations personnelles. [**Nerve Leprosy and its Complications, from the Point of View of the Surgeon, with 40 Personal Observations**] *Méd. Trop.* Marseilles. 1957, July–Aug., v. 17, No. 4, 495–541, 31 figs. [54 refs.]

This long and beautifully illustrated article should be studied carefully by all interested in the prevention of deformities and restoration of function in leprosy patients by means of surgery. Many of the 40 cases are described in detail and the operative technique is explained and illustrated. Operation for decompression of nerves is advised in all cases where there is active neuritis except where in long-standing cases the nerve fibres have all been destroyed. The operation favoured by the authors is freeing of the nerve bundles and the resection of hypertrophic connective tissue. The techniques of tendon-transplantation in both hand and foot are explained. Certain warnings are given regarding such operations: (1) do not intervene in advanced cases where the joints have become fixed in the position of claw-hand; (2) do not use replacement muscles, the nerve supply of which is partly impaired or may become impaired; (3) do not practise bone intervention if there is trophic trouble; (4) persist with physiotherapy of the paralysed muscles for a long time; (5) test recovering muscles by chronaximetric and electromyographic methods for their absolute soundness.

With the use of sulphones, surgery in leprosy is no longer a losing battle. *Ernest Muir*

HELMINTHIASIS

American Soc. Trop. Med. & Hyg. **Papers presented at Symposium on Helminthic Infections as the Cause of Disability and Disease.** Annual Meeting, New Orleans, Louisiana, November 1, 1956 [Stoll, N. R., Moderator]. *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 399–486, 21 figs. & 2 maps. [Numerous refs.]

N. R. Stoll introduced the symposium in which there was no formal discussion on any helminth infection; recent studies in a few of the great problems of helminthiasis in man were considered together with some of the possible methods of control.

Dr. J. F. Kessel (*Disabling effects and control of filariasis*, pp. 402–414) reviewed the distribution and prevalence of clinical filariasis and of microfilaraemia in Africa and in Asia. The correlation of the various records is difficult because the results of the clinical, blood and mosquito surveys in different areas were not standardized. It was difficult to assess the disability due to filariasis in terms of man-days' work lost annually in the community, but he believed that the social and economic aspects of filariasis constituted a major public health problem in the tropics.

While the prevalence of elephantiasis and of the microfilaraemia could not always be correlated in the South Pacific, the incidence of elephantiasis there could be correlated with the density of the microfilaraemia.

"A filariasis control program now in progress in the Society Islands, which combines mosquito control with parasite control by mass treatment with diethylcarbamazine, shows that when practiced thoroughly, these measures reduce microfilaremia, microfilarial density, the mosquito population and larval density in mosquitoes to a minimum. Primary acute filariasis is rare; new cases of elephantiasis together with other forms of chronic filariasis fail to develop; and transmission is reduced to a low point, in some instances to zero."

E. K. Markell suggested that reported clinical differences in the diseases from the Pacific area and from Africa might be due to the different methods of undertaking surveys, for in some areas persons warranting medical attention might be accidentally selected.

E. H. Sadun (*Fasciolopsiasis and opisthorchiasis as helminthic components of tropical public health*, pp. 416–422) found that in three areas in Central Thailand where the water caltrop was cultivated, 13% of 1,563 persons harboured *F. buski*. The incidence was highest in the 5–14-year age-group, and the intensity of infection (assessed by the egg count) was highest in the 10–14-year age-group. (The water caltrops are often picked and eaten fresh by the children on their way to school.) The people live in floating villages, and move around mostly by skiff or canoe; although the latrines are built over water, human faeces are not purposely used as fertilizers. *Opisthorchis viverrini* occurs in man and

cats. Human infection is confined to the north and north-eastern region, and probably a quarter of the population of north-east Thailand are infected, and probably the greatest incidence is along the Mekong River. Impairment of the liver function is proportionate to the duration and the intensity of the infection.

W. W. Cort stated that treatment of these infections is difficult because the small bile ducts become walled off; prophylaxis and control are also difficult since they involve changing long established methods used in the preparation of fish which is the most important source of protein in the diet of the people.

J. B. Poole (*Echinococcus disease in northern North America*, pp. 424–429) said that 18% of 309 natives of the Keewatin area bordering Hudson Bay had positive Casoni tests (Dr. T. W. M. Cameron). They hunt wild herbivores whose viscera they feed to their sledge-dogs, and they live in close association with their dogs in filthy conditions in crude log cabins or tents. *Echinococcus* infection appears to be mainly sylvatic in the moose and other deer and in foxes, coyotes and wolves, in the northern parts of Canada and Alaska. In the Aleutian Islands, Rausch and Schiller [see this *Bulletin*, 1951, v. 48, 661] described an alveolar hydatid found in wild rodents.

B. Schwartz suggested that systematic autopsies of country dogs should be done to determine whether they, or wolves or other wild carnivores, were responsible for transmission.

It was stated by P. C. Beaver (*Wandering nematodes as a cause of disability and disease*, pp. 433–437) that visceral larva migrans, due to infection with *Toxocara canis*, occurs in small children of the dirt-eating age, who ingest the embryonated eggs. The larvae hatch in the small intestines and reach the liver, lungs, central nervous system and other organs and become encapsulated though they may live for two years within the capsule. Species of filaria, harmless in their normal hosts, may cause cerebrospinal manifestations in other definitive hosts. Wandering nematode infections may act as vectors or predisposing factors in the introduction of other disease organisms, *e.g.*, *Histomonas meleagridis* is carried to turkeys in the eggs of *Heterakis gallinae*. *Dientamoeba fragilis* may be transported from host to host in the eggs of *Enterobius* and *Toxocara canis* larvae may localize Japanese B encephalitis virus. A number of clinical conditions associated with eosinophilia may be due to migrating nematode larvae.

Professor A. C. Chandler suggested that parasites misplaced in abnormal hosts showed various degrees of "getting lost". *Ancylostoma duodenale* has no difficulty in finding its way to the intestine of man. *A. ceylanicum*, a common parasite of cats and dogs, constitutes about 4% of the adult hookworms in man, but is not known to cause creeping eruptions. It commonly migrates beyond the skin but only exceptionally completes its journey. *A. caninum* practically never completes its journey but forms papules instead of tunnels in the skin. *A. braziliense*

seldom finds its way beyond the skin, in which it forms the tortuous tunnels of "creeping eruption". FÜLLEBORN, and SPRENT [see this *Bulletin*, 1955, v. 52, 1001] consider the size of the invading larvae of importance. "Larvae 10μ or less in diameter, e.g., microfilariae and *Trichinella* larvae, pass the pulmonary capillaries unimpeded and are distributed all over the body. Those over 20μ, like larvae of *Ascaris*, *Parascaris* and hookworms, break out into the alveolar spaces of the lungs and have a 'tracheal' migration. The larvae of many of the ascarids of carnivores, including *Toxocara canis*, are intermediate in size, and undergo a somatic migration. Where they are finally trapped probably depends in part on the hosts and the size of their capillaries in various organs, and in part on the normal course of migration for the species. Some, like *Toxascaris* and *Oesophagostomum*, do not usually migrate beyond the intestinal mucosa even in normal hosts. *Toxocara canis* seems especially prone to become stranded in the liver in man." Growing and non-growing larvae produce different reactions. Previous sensitization may be a factor influencing pathogenicity.

Under the auspices of the World Health Organization, H. W. BROWN (*Peripatetic parasitologist*, pp. 441–454) visited countries in the Near East, Africa, South and Central America to see the rural, primitive conditions under which diseases are acquired, and pilot projects instituted for their control. Nutrition, transportation, dysentery, malaria, schistosomiasis, intestinal parasitism, onchocerciasis, leishmaniasis and Chagas's disease are briefly described. The necessity for training sanitarians is discussed.

In this provocative paper (*Helminth production in livestock; tonnage, carrying costs and control*, pp. 455–461) D. C. BOUGHTON suggested that mild parasitic infections might be of greater practical significance when economic production is the chief consideration rather than health in the usual sense. The livestock industry is under increasing pressure for greater efficiency and prevention of infection is increasingly important. If a prophylactic drug effective against the infecting stages is not available then a drug effective against the "post-adult" forms, *i.e.*, the eggs, embryos and newly hatched larvae, such as phenothiazine, may be used.

Aurel FOSTER pointed out that an interest in economic parasitology and the principles of parasitism shows that sound measures against parasites can come only from a fullness of knowledge.

J. W. DAUGHERTY (*The active absorption of certain metabolites by helminths*, pp. 464–470) points out that to study the physiology and biochemistry or any other aspects of a parasite's existence without adequate consideration of its host and their inter-relationship is difficult. Furthermore, experimental research in parasitic physiology is not easy because of the inability to obtain comparable results in different investigations under undefined or unreproducible host conditions. For these reasons it has become necessary to study the chemical composition of

the parasite and the activity of its metabolic systems and those of the host.

It seems that in *Hymenolepis diminuta* there may be at least two mechanisms for the active absorption of amino-acids—one for the neutral amino-acid and one for the dibasic.

C. G. GOODCHILD suggested that amino-acids might have to undergo interconversion in tapeworms as they do in vertebrates, and he wondered whether the uptake and competitive effects of ketogenic amino-acids were similar to those of the glucogenic acids.

R. W. LEWERT and Chang-Ling LEE (*The collagenaselike enzymes of skin-penetrating helminths*, pp. 473–477) state that histochemical methods have been used for the preservation and visualization of the products of the reaction between the acellular material and the parasitic enzymes in the traversing of the different layers of the skin by the infective larvae of helminths.

Polysaccharide containing protein can be identified and the degree of polymerization can be assessed by the staining reactions. The changes in the state of polysaccharide-containing protein of the basement membrane and of the ground substance of the dermis can be followed with increasing age, and its relation to age-immunity can be assessed. By similar means the enzymes possessed by infective larvae of different helminths can be identified, and measured photometrically.

It is possible by this means also to study the inhibitors of cercarial enzyme in the serum of immune animals.

R. E. THORSON stressed the difficulties in naming specifically an enzyme unless the substrate used is entirely appropriate and unless the end products of reaction are completely known. Many substances regarded as "impurities" may react favourably or unfavourably on enzymes. The substances in the serum from infected persons which inhibit penetrating enzymes are predominantly located in the globulin fraction.

P. WEINSTEIN and M. F. JONES (*The development of a study on the axenic growth in vitro of Nippostrongylus muris to the adult stage*, pp. 480–484) describe how the larvae of *N. muris* have been reared for many years to the filariform stage on living bacteria, less easily on formalin-killed bacteria and not on heat-treated bacteria. Bacteria-free conditions in *in vitro* culture were made possible by chemical sterilization and by antibiotics. The addition of fresh tissue such as chicken embryo extract or fresh rabbit kidney to a complex medium consisting of heat-killed yeast, liver extract and agar has given consistently good results.

The identification of the soluble growth-promoting components in embryo extract has been attempted by dialysis and dilution. By these two techniques it should eventually be possible to identify specifically the water-soluble vitamins. The combination of components common to many bacteriological media—a mixture of sodium caseinate, yeast extract and serum—will support larval development to the filariform stage, and with the addition of embryo extract and liver concentrate as

an alternative to yeast extract, a few would reach sexual maturity. By raising considerably the concentration of embryo extract, the liver concentrate and caseinate can be omitted. Though sexual maturity is attained, mating does not seem to occur in these conditions.

C. P. Read compared the facilitation of growth *in vitro* by the addition of chick embryo extract with the effect of fresh rat serum in establishing an infection of *N. muris* in the hamster. Chick embryo extracts promote growth in tissue and cell culture experiments, more consistently than extracts of other tissues, and this suggests that growth-promoting substances may be present in low concentration in adult tissues, and that adult tissue may contain anti-growth factors or inactivating other substances. That development occurs if the larvae are given intradermally, subcutaneously or intravenously or into the hepatic portal system, suggests that the skin and lungs are not essential physicochemically for development. *W. E. Kershaw*

Santillana, E. Encuesta de helmintos intestinales en la provincia de Sandia (Departamento de Puno). [**Survey of Intestinal Worms in Sandia Province, Peru**] *Rev. Med. Exper.* Lima. 1956, Dec., v. 10, No. 2, 155–65, 2 figs. & 1 map. [10 refs.]

The English summary appended to the paper is as follows:—

"The microscopical examination of one stool sample from 290 individuals from Sandia province, department of Puno, has shown:

"1. The incidence of intestinal helminths is high (91·03%).

"2. The incidence of the different species of intestinal helminths has been found as follows:

Ascaris lumbricoides	79·8 per cent
Trichocephalus [*Trichuris*] *trichiurus*	75·8 per cent
Ancylostoma or *Necator*	22·8 per cent
Hymenolepis nana	5·5 per cent
Strongyloides stercoralis	4·8 per cent

"3. The incidence for localities, in the case of *Ancylostoma* or *Necator*, increases as we go down to the jungle.

"4. The most frequent association of parasites has been *Ascaris lumbricoides-Trichocephalus trichiurus*."

Cavier, R. & Debelmas, A. M. Contribution à l'étude des propriétés anthelminthiques de quelques antibiotiques et de leurs associations. [**Study of the Anthelmintic Properties of Some Antibiotics and their Associations**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 402–7. [23 refs.]

MILLER, M. J. **A Survey of *Schistosoma haematobium* Infections in Man in Liberia.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 712–14, 1 fig.

Although schistosomiasis has been recorded in Liberia [this *Bulletin*, 1932, v. 29, 409; 1933, v. 30, 635], the data on its distribution have not been provided. The present author has studied 3,429 young male employees of 2 rubber plantations and a mining company, by examination of a single specimen of urinary sediment for ova. In none of the areas concerned had the snail hosts been detected, but the men came from widely scattered parts of Liberia. The place of residence and areas visited were determined by questioning each man. It was found that 865 (26%) were positive for *S. haematobium* ova, but this figure was not significant, as incidence was determined by the number of men coming from areas of high endemicity. The origin of some 40 regional groups is shown on a map, from which it is clear that the highest infection rates were in the upper part of the Central Province, where the figure exceeded 50%. The coastal half of Liberia was free of infection, as was the entire Eastern Province and much of the Western Province. *S. mansoni* eggs were found in about 0·3% of the urine specimens.

H. J. O'D. Burke-Gaffney

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. No. 120. **Study Group on the Ecology of Intermediate Snail Hosts of Bilharziasis, Paris, 3–9 October 1956. Report.** 38 pp. 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [1s. 9d.; $0.30; Sw.fr. 1.–.]

About two-thirds of this report concerns hydrogeological factors as they relate to snail distribution, the physical, chemical and biological factors affecting the suitability of habitat and the influence of season and climate upon the molluscan life cycle. The remainder of the report is devoted to control measures. Present ecological information is summarized and discussed in relation to control problems; methods are given for estimating snail densities and suggestions are offered for further ecological and physiological studies.

The four main hydrogeological factors, slope of land (orography), soil and bedrock (lithology), geological history and climate (regional rainfall and temperature), form the general basis for consideration of classification of freshwater situations and are largely immutable except where human activities have created change by means of irrigation, damming and drainage. Study of these conditions influences the choice of vector control within an area and assists in the assessment of the spread of bilharziasis across ecological barriers. [Bilharziasis has been chosen as the term to describe the diseases caused in man by the genus *Schistosoma*. This term was recommended by the International Commission on

Zoological Nomenclature, 1954, which also decided that *Schistosoma* Weinland, 1858, should be the generic name of the causative organisms. This practice may not commend itself to all since, in some parts of Africa, the term "bilharziasis" is thought to relate specifically to urinary schistosomiasis and is not in general usage in the orient or in South America.]

The physical factors conditioning the habitat and breeding conditions are temperature, light intensity, water movement, fluctuation in water level, desiccation and depth of water. While schistosome vectors show tolerance to variation in water temperature the optimum lies, in general, between 22°C. and 26°C. with a range of 18°C. to 32°C. Data provided relate specifically to *Bulinus truncatus*, *Australorbis glabratus*, *Oncomelania nosophora* and *O. quadrasi*. Seasonal variation in temperature plays a considerable part in limiting the length of the breeding season and, consequently, the number of generations produced. Insufficient evidence of the effects of light intensity upon the activities of snails permits only of general comment. Some interspecific differences appear to be present because, whereas *A. glabratus* appears to enjoy direct sunlight, African bulinids and planorbids and *Oncomelania* spp. tend to seek shady habitats. However, adequate sunlight is required to promote growth of the flora necessary as food. The general consensus of opinion appears to be that schistosome vectors prefer stagnant or slowly running waters. Wave action as experienced in lakes or reservoirs is markedly deleterious while flood waters are uniformly harmful to snail populations. The main import of water-level fluctuation is the possibility of exposure of the snails to desiccation. Great variation in resistance to desiccation has been shown in recent work but the existence of intraspecific variation leads to the suggestion that such variation may be of genetical origin. While mature cercariae of *S. mansoni* die out rapidly in aestivating *A. glabratus* the immature stages may survive. While depth of water *per se* is not a limiting factor in vertical distribution, snails are more commonly found in shallower waters where food is most abundant owing to the penetration of sunlight and where the oxygen tension is more likely to be highest in the region of gaseous exchange with the atmosphere.

The important chemical factors concerned in snail ecology are salinity, ion balance (of dissolved solids) and *p*H. While snails are known to tolerate a wide range of *p*H in natural waters, no correlation seems to exist between the calcium-magnesium ratio and distribution; more definite evidence is available concerning the limiting nature of salinity. The total amount of dissolved solids is of less importance than the proportion of the constituents. Pollution of water, to some degree, by decaying organic matter and excreta is of advantage to growth of snail colonies while chemical pollution is uniformly deleterious. Methods are given of estimating the biological index of pollution.

Known natural enemies and predators are listed but it is doubtful if these play any significant part in control of molluscan populations. The

introduction of specific predators would probably result in biological equilibrium. Little is known about parasites and diseases of molluscs but it is urged that more work should be done on the possible value of microbiotic agents of destruction. Snails exhibit little preference for food except that they are primarily phytophagous. While *Oncomelania* and the bulinids favour food of plant origin, planorbids are also found feeding on material of animal origin. The presence of water plants in the habitat is desirable but not essential. Their function is largely one of providing sites for algal growth, oviposition and shade from strong sunlight, while emergent vegetation offers facilities for amphibious species.

In the section dealing with the influence of season and climate the known significant factors as outlined in the earlier section of the report are discussed in relation to one another in their influence on the life cycle of the molluscs. Much is unknown concerning these relationships and it is assumed that since widely differing species can be bred under uniform laboratory conditions, certain basic factors are associated with the various habitats.

The relationship of ecological findings to control measures is discussed under the headings of Molluscicides, Sanitation Measures, Irrigation, Water Management and Fishing and Farming Practices. Insufficient ecological knowledge hampers the efficient application of the very limited range of chemical molluscicides, but the information available is analysed and suggestions are made concerning the conditions under which optimum effects of such control measures may be achieved. A formidable list of problems requiring investigation underlines the unsatisfactory position of chemical control. Sanitation measures discussed are essentially those of preventing the fouling of waters by human or animal excreta. The problems of irrigation engineering are numerous and many recommendations are made concerning the rate of water flow, weed-clearance, control of channels to eliminate standing water, and the covering and lining of waterways wherever possible. Suggestions are made for modification of agricultural and piscicultural practices but it is conceded that control by this means is beset with difficulties. Under certain local conditions some success may be achieved.

The report concludes with a section on methods of measurement of density of molluscan populations during survey and control and an extensive list of suggestions for further studies in ecology and physiology in relation to control measures.

The study group has produced an interesting and rewarding report on molluscan ecology and control. It has emphasized throughout the scarcity of accurate information in a subject of great breadth and has stressed the need for far greater application to the numerous problems involved if progress is to be made on more than a local scale. Studies of this kind are necessarily long-term in character and it may be felt that, if viewed in this light, the solution to the shortage of specialist man-power may not lie in the recommended provision of international teams but in the

appreciation by interested governments of the need for training their own specialists for work in conditions peculiar to their own territories.

O. D. Standen

DESCHIENS, R. Les facteurs conditionnant l'habitat des mollusques vecteurs des bilharzioses, leurs incidences épidémiologiques. [**Factors Conditioning the Habitat of Snail Hosts of Schistosomes and their Epidemiological Significance**] III.—Flore et faune des gîtes, ennemis naturels, maladies compétitions, fluctuations. [**Flora and Fauna of Breeding Places, Natural Enemies**] IV.—Constantes physiologiques de la reproduction et particularités en fonction des espèces. Conclusions. [**Physiological Constants of Reproduction and Characters in Relation to Species. Conclusions**] *Ann. Inst. Pasteur.* 1957, July, v. 93, No. 1, 1–12. [12 refs.] *Ibid.* Aug., No. 2, 153–67.

PIMENTEL, D., WHITE, P. C. & ILDEFONSO, V. **Vagility of** *Australorbis glabratus*, **the Snail Intermediate Host of** *Schistosoma mansoni* **in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 576–80, 1 fig.

In an attempt to determine the wandering propensities of *Australorbis glabratus*, 11,307 marked specimens ranging in diameter from 8 mm. to 29 mm. were released in a 2,700-foot length of a stream in Puerto Rico. This length was divided into 13 sections. The snails were marked with coloured lacquers referable to each section and were released in the centre of each section. Each section was then marked off in 4-foot lengths and sampling from each sub-section was carried out over a period of 7 weeks. The snails gathered in any sub-section were returned to that sub-section. From the ratio of marked to unmarked snails recovered, it was calculated that this length of stream was populated by some 29,058 snails. During the first 24 hours the average movement up or down stream was 6 feet. This increased to 23 feet upstream and 19 feet downstream by the second week. Thereafter the distribution remained static until the 5th week when a general downstream movement occurred. The major downstream movement was probably due to the physical force of water rather than to any tropistic influence. Some observations are included on the possible modes of movement from one body of water to another. Flood waters may assist in snail dissemination and young snails or egg masses may be translocated on the feet of birds or other animals. Instances were observed where egg masses of *A. glabratus* were deposited on water insects; one instance of direct attachment of a species of *Ferrissia* to an insect was also seen. From this it is thought that insects might be one agent of transference of snails from one locality to another.

O. D. Standen

CHAFFEE, E. F. & NIEVES, Edna E. **Serodiagnosis of Schistosomiasis: Specificity of the Complement-Fixation Test in other Helminthic Infections.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 727–30. [12 refs.]

Previous work by Chaffee *et al.* [this *Bulletin*, 1955, v. 52, 173] had shown that extraction of *S. mansoni* with ether before extraction with saline improved the specificity of the complement-fixation test for schistosomiasis by removing substances that reacted with syphilitic serum. In the present work, trials were made to see whether the test also gave positive results with helminthic infections other than schistosomes. 39 men from Trinidad (where schistosomiasis does not occur) were examined and 69 men from Puerto Rico. All harboured nematodes, chiefly *Trichuris*, hookworm, and *Ascaris*, but some also harboured *Strongyloides stercoralis*. The sera of all the men from Trinidad yielded negative results in the complement-fixation test with schistosome antigen and so did all but 2 of the sera from the Puerto Ricans. In these 2 patients no schistosome ova could be found, but in 1 there was an eosinophilia of 60% suggesting acute schistosomiasis. The sera from 8 Japanese infected with *Paragonimus* were also examined; 1 gave a weak reaction and 1 gave a double plus reaction, the other 6 were negative.

Apparently the specificity of the complement-fixation reaction, with antigen previously extracted with ether, is not impaired by concomitant nematode infection and it is impaired only to a small extent by other trematodes such as *Paragonimus*. *F. Hawking*

DE ARGUMOSA, J. A. Tratamiento de la esquistosomiasis mansónica. [**Treatment of** *Schistosoma mansoni* **Infections**] *Medicina.* Mexico. 1957, Apr. 25, v. 37, No. 770, 174–85. [Numerous refs.]

A general review.

CORRÊA, M. O. A. & AMATO NETO, V. Tratamento da esquistossomíase mansônica por via oral: resultados obtidos com o emprêgo do cloridrato de miracil D (esquema de 20 dias) e do óxido estanhoso. [**Oral Treatment of** *Schistosoma mansoni* **Infection. Results with Miracil D and with Stannous Oxide**] *Rev. Inst. Adolfo Lutz.* Sao Paulo. 1956, v. 16, 74–7.

The English summary appended to the paper is as follows:—

"The authors employed the scheme of treatment for schistosomiasis suggested by HALAWANI *et al.* [this *Bulletin*, 1955, v. 52, 907]. Nine adults with mansonic schistosomiasis were given Miracil D hydrochloride in two or three daily doses for 20 days. Each dose consisted of a 200 mgm. tablet. The following toxic side-effects were frequent among patients: neusea, vomiting, anorexia, diarrhea, abdominal pain, weakness, malaise, giddiness and insomnia. No parasitologic cure was obtained.

"Bilharstan, a stannous oxide pharmaceutical was employed in the treatment of two other patients with mansonic schistosomiasis. Fecal elimination of eggs continued after treatment in both cases, which confirms previous findings by the authors and contradicts the report of MAUZÉ and ARNAUD [*ibid.*, 1954, v. 51, 1174]. These patients were given eight 0·5 gm. tablets daily for eight days in three series separated by an interval of one week between any two series."

ASHTON, N. **Degeneration of the Retina due to 1:5-Di (*P*-Aminophenoxy) Pentane Dihydrochloride.** *J. Path. & Bact.* 1957, July, v. 74, No. 1, 103–12, 9 figs. on 4 pls. [28 refs.]

Certain diaminodiphenoxy alkanes were found by RAISON and STANDEN [this *Bulletin*, 1955, v. 52, 997] and by HILL [*ibid.*, 1956, v. 53, 1141] to possess marked curative action against experimental infections of *Schistosoma mansoni*. Unfortunately, subsequent work showed that they also exerted a powerful toxic effect upon the retina of monkeys, dogs, cats (and man) although not on the retina of rodents. This toxic action prevented the compounds from being used clinically. The present paper describes a study of the effect of one of these compounds, $H_2N.C_6H_5.O(CH_2)_5\text{-}O.C_6H_5.NH_2$ (M & B 968A), upon the eyes of cats. The main ocular findings were abolition of the pupillary light reflex, pallor of the discs, striking attenuation of the retinal vessels and pigmentary degeneration of the retina. Histologically there was (in the following sequence) degeneration of pigment epithelium; formation of retinal arcades; loss of visual cells; destruction of the outer limiting membrane; intra-retinal migration of pigment; and destruction of the outer nuclear layer.

In the early stages, these changes were usually patchy, but the inner retinal layers and the optic nerve remained relatively unaffected even when the outer retinal layers were totally destroyed. Other organs were usually unaffected. The action of the compound closely resembles that of sodium iodate, the primary lesion being a toxic choroidoretinitis.

F. Hawking

HSÜ, H. F. & HSÜ, S. Y. LI. **On the Intraspecific and Interstrain Variations of the Male Sexual Glands of *Schistosoma japonicum*.** *J. Parasitology.* 1957, Aug., v. 43, No. 4, 456–63, 17 figs. [12 refs.]

SHAO, Pao-Juo, HSÜ, Hsüeh-Chi & MAO, Shou-Pai. **Studies on the Artificial Infection of *Oncomelania* Snails with Miracidia of *Schistosoma japonicum*.** *Chinese Med. J.* Peking. 1957, Mar., v. 75, No. 3, 189–211, 3 figs. [22 refs.]

This report describes the results of experimental infections of *Oncomelania hupensis* with *Schistosoma japonicum* carried out over a period

of 3 years at the Institute of Parasitology, Nanking, China. During this period, more than 300,000 snails were experimentally infected.

Except for batches of snails drawn from various provinces and exposed to a local strain of *S. japonicum*, the majority were collected at P'uchen, Nanking. Wild snails were used for the greater part and the low grade natural infection of the area was ignored. Miracidia were hatched from eggs present in the livers of experimentally infected rabbits. Infection of snails was carried out *en masse* at an exposure rate of 60–90 miracidia per snail. The exposed snails were reared in unglazed earthenware pots, containing local soil, standing in water sufficiently deep to keep the soil moist. The food provided was a 2% wheat and bean powder mixed in an infusion of Chinese lettuce leaves. After some weeks the snails were sampled every 3–7 days and examined by crush technique until mature infections were found. Thereafter they were subjected to cercarial shedding tests [this *Bulletin*, 1950, v. 47, 478] in water at fortnightly intervals and the infected specimens were segregated. It was found that the mortality rate of infected snails was greater than that of uninfected snails.

In one series of 151 experiments involving infection of 47,035 snails the infection rate varied from 52·4% to 94·0%. The duration of infection was considerable and in one specimen was known to persist for 32 months. In no instance was the infection subject to spontaneous cure. To determine the effects of temperature upon the infectivity of miracidia, exposures were carried out at 31°C., 21°C. and 28°C., 5°C. in two experiments. At 21°C.–31°C. the infectivity rate was 60–65%; at 5°C. it was 3·5%. Variation in the upper range made no significant difference while at 5°C. the miracidial hatch was low and the infectivity greatly impaired. Records were kept of the developmental rate from sporocyst to cercaria over a period of 1 year. The mean monthly temperature ranged between 11°C. and 31·4°C. The rate of development was markedly reduced in the colder weather; the shortest miracidium-cercaria interval was 44 days, the longest was 185 days when the mean temperatures were 30·6°C. and 17·0°C. respectively. Examination of the mortality rate indicated that normal snails were unaffected but that the mortality of infected snails was greatest during the warmest months. Artificial reduction of temperature to 8°C. retarded the output of cercariae in known infected snails but return to 30°C. resulted in resurgence of cercarial shedding. It is thought that the increase of cercarial shedding at higher temperatures may be responsible for the higher snail mortality rate observed in infected specimens.

Only a small proportion of infected snails survived desiccation to 40 days at 17·5°C.–24·5°C. Up to 33 days the cercarial output of samples withdrawn from these specimens was similar to that from controls kept on moist earth. After this, cercarial output was much reduced in snails kept under dry conditions. The effects of temperature on the infectivity of cercariae kept at 25°C., 15–18°C. and 3–5°C.

showed that so long as the cercariae remained active they were equally infective to white mice regardless of temperature.

Experiments were performed to compare the susceptibility to infection, with the P'uchen strain of *S. japonicum*, of snails collected in several provinces of China. The results of the experiment were vitiated to some extent by the high mortality rate in the imported cultures but the authors are satisfied that *Oncomelania* from different endemic areas in China respond differently to *S. japonicum* miracidia from P'uchen. The possibility of the existence of different schistosome strains was not established.

In experimental infections of male and female snails carried out in 352 and 354 specimens respectively the infection rates were 89·5% in males and 75·4% for females. This is considered significant but the proportions were reversed in naturally infected snails collected in the field. The relative susceptibility of snails of different size to experimental infection indicates that infection is not confined to young snails and is, in fact, higher in adults although the infection matures more quickly in the young. *O. D. Standen*

CH'EN, Ming-Chai & CH'EN, Wang Shan-Chi. **Acute Colonic Obstruction in Schistosomiasis japonica. A Clinical Study of 40 Cases—14 associated with Carcinoma.** *Chinese Med. J.* Peking. 1957, July, v. 75, No. 7, 517–32, 12 figs. (11 on 4 pls.) [22 refs.]

Large bowel obstruction due to Far Eastern schistosomiasis has long been known to occur, but too often it is mistaken for primary malignant disease. Adenocarcinomatous changes may in some cases be resultant on colonic lesions of schistosomal origin. After a review of the literature on this subject the authors present details of 40 cases of obstruction they have seen. These constituted 10% of their 398 diagnosed cases of schistosomiasis, or 17·2% of 232 cases of chronic schistosomal colitis encountered between 1951 and 1955. Most of the patients were 20–45 years old; 19 were between 25 and 35 years; and the average age was 36·4 years. Nearly all were fishermen or farmers; only 8 were women. The heavier the infection, the longer its duration, and the more frequently reinfection took place the greater the colonic involvement. The rectum was involved in 25 cases, and the sigmoid colon in 6 cases—a total of 77·5% of the series. The transverse colon (4 cases), caecum (2 cases), splenic flexure (2 cases) and hepatic flexure (1 case) were the seat of trouble in the remainder. Obstruction was complete in 15 cases, and emergency colostomy was done in 12 of these. The clinical picture was characteristic of large bowel obstruction. Stools yielded ova in 80% of the series, but in 3 cases repeated stool examinations by various methods yielded no ova; rectal biopsy gave the diagnosis in these 3. Barium enemata were given in 27 cases, and X-ray examination then showed the obstructions to be of an ulcerative, of an annular, or of a

polypoid type. After removal the intestinal wall in all cases was found to be much thickened and its lumen narrowed; the whole gut wall was thickened but the mucosa especially was greatly thickened. The polypoid growths were sessile and rarely pedunculated. The complications were perforation (4 cases), adenocarcinomatous changes (14 cases) and urological involvements. Intussusception occurred in one instance, and acute appendicitis in another. 30 patients needed surgical treatment, and in 11 of these resection of the bowel was deemed necessary.

Antimony treatment alone can hardly resolve the tissue damage and stenosis due to continuing years of infection. The prognosis is poor with palliative treatment alone, but it improves with successful resection of the seriously affected bowel, followed by thorough antimony treatment 3 or 4 months after the acute surgical emergency has been dealt with.

The exact mode of causation of the malignant changes is not clear; epithelial metaplasia or polypoid formation may precede adenocarcinomatous changes. Prevention of gross colonic changes in schistosomiasis depends on early recognition of the existence of the infection and its effective chemotherapeutic treatment. The present intensive campaign against this disease in China should do much to lessen the incidence of this grave complication. *A. R. D. Adams*

FAIN, A. & VANDEPITTE, J. Description du nouveau distome vivant dans des kystes ou abcès rétroauriculaires chez l'homme au Congo belge. [**Description of a New Distome living in Retroauricular Cysts or Abscesses in Man in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1957, Apr. 30, v. 37, No. 2, 251–8, 1 fig.

One of the authors discovered, in 4 Africans of the Kasai region of the Belgian Congo, subcutaneous cysts or abscesses behind the ears, containing operculated eggs resembling those of *Paragonimus westermani*, but slightly smaller. These patients are described by VANDEPITTE *et al.* [below] and by FAIN and VANDEPITTE [this *Bulletin*, 1957, v. 54, 980]. None of the patients showed signs of pulmonary distomiasis and there were no eggs in the sputum; but 2 of them came from a region in which pulmonary distomiasis, attributed to *Paragonimus*, occurs. An adult fluke was removed from one of the cysts and this was not a species of *Paragonimus*, but a remarkable new species, which resembled a distome found by DOLLFUS (*Ann. Parasit. Humaine et Comparée*, 1939, v. 17, 209) in a palpebro-orbital abscess of a leopard in Malaya. Dollfus called this fluke *Achillurbainia nouveli*, creating for it the new family Achillurbainiidae.

The fluke here described and figured by the present authors certainly belongs to this new family, but it differs from *A. nouveli* and the authors create for it the new genus and species *Poikilorchis congolensis*, n.g., n.sp. They describe it in detail and also give the features of the family Achillurbainiidae.

They discuss the important question whether there are not two causes of paragonimiasis in Central Africa, species of the genus *Paragonimus* and *Poikilorchis congolensis*. The parasite found by LIBERT [this *Bulletin*, 1932, v. 29, 412] in the Cameroons in a patient with pulmonary paragonimiasis may have been *P. congolensis* and it is probable that the fluke found by YARWOOD and ELMES [*ibid.*, 1943, v. 40, 704] also was. There is as yet no proof that *P. congolensis* cannot cause pulmonary paragonimiasis. The authors think, on the contrary, that both parasites may play a part in the causation of pulmonary paragonimiasis and that they may be associated in the same region and perhaps in the same patient. *G. Lapage*

VANDEPITTE, J., JOB, A., DELAISSE, J. & TABARY, M. J. Quatre cas d'abcès rétroauriculaires chez des Congolais, produits par un nouveau distome. [**Four Cases of Retroauricular Abscesses in Congolese caused by a New Distome**] *Ann. Soc. Belge de Méd. Trop.* 1957, Apr. 30, v. 37, No. 2, 309–15, 3 figs. on pl. [10 refs.]

The authors here describe more fully retroauricular abscesses in 4 young Africans of the Kasai region of the Belgian Congo reported by FAIN and VANDEPITTE [this *Bulletin*, 1957, v. 54, 980]. 2 of the patients were diagnosed at the Ipamu hospital, near Mangaï, and the Ipamu region is the only site of pulmonary paragonimiasis known in Central Africa. The other 2 patients, diagnosed at Luluabourg, seemed to have become infected at Merode (Bakwanga territory) and at Bakwa Kalonji (Mwene-Ditu territory).

The first patient, a girl about 15 years old, in good health, who had always lived at Mateko on the river Kamtsha, had a fluctuating tumour about the size of a pigeon's egg behind the left ear, a photograph of which is given. In the aspirated pus a large number of brown, operculated eggs were found, which were taken to be those of *Paragonimus westermani*. The patient had no cough and there were no eggs in either the sputum or faeces. The whole cyst was excised, but no adult fluke was found in it. The second patient, a woman of 20 years, from the village of Ibay on the same river, had a similar cyst. She had no cough and no eggs were found in the sputum or faeces. Eggs 64 μ long were found in the cyst, but no adult fluke. The third patient, a girl of 14 years, living at Merode, had a similar tumour behind the right ear, which is shown in a photograph. The eggs in this measured 63 × 40 μ. There were no eggs in the sputum or faeces and no adult fluke was found. The fourth patient, a boy of 11 years, living at Luluabourg, had a fluctuating tumour behind the left ear. Similar eggs, of which a photograph is given, were found in this, but none were found in the sputum. In this cyst a brownish-red adult fluke was found. The histology of the cyst walls is described.

The existence of paragonimiasis caused by *P. westermani* in the

Ipamu region suggested that the cysts described were caused by this fluke, although the lungs of all the patients were normal and there was no evidence of pulmonary paragonimiasis. The authors refer to the literature on the distribution of paragonimiasis in the Belgian Congo, the Cameroons and Southern Nigeria, but the fluke found in their fourth patient produced eggs smaller than those of *P. westermani* and it proved, as the description of it by Fain and Vandepitte [above] showed, to be not *P. westermani* but the new genus and species *Poikilorchis congolensis*, which had not hitherto been found in man in Africa."

Discussing the literature on the occurrence of paragonimiasis in the Belgian Congo, the Cameroons and Southern Nigeria, the authors ask whether the facts do not suggest that there are two causes of African paragonimiasis, *Paragonimus westermani* and *Poikilorchis congolensis*, the latter being specifically African. VAN HOOF [this *Bulletin*, 1934, v. 31, 377], VAUCEL [*ibid.*, 1956, v. 53, 264] and YARWOOD and ELMES [*ibid.*, 1943, v. 40, 704] express the same view, but further research is needed to show whether *P. congolensis* can cause pulmonary paragonimiasis; the work of LIBERT [*ibid.*, 1932, v. 29, 412] seems to indicate that it can. *G. Lapage*

SOULSBY, E. J. L. **An Antagonistic Action of Sheep Serum on the Miracidia of** *Fasciola hepatica*. *J. Helminthology*. 1957, v. 31, No. 3, 161–70, 1 fig. [16 refs.]

"A thermostable serum constituent is described which has a lethal effect on the miracidia of *F. hepatica*. This requires the thermolabile components of guineapig complement for its lethal action. It is apparently similar to substances present in other normal sera and which have an antagonistic action on a wide range of organisms.

"The mode of action is discussed."

MAZIDIS, S. P. [Sur un cas de dicrocoeliose humaine.] [**A Human Case of Dicrocoeliasis**] *Acta Microbiologica Hellenica*. Athens. 1957, Jan.–Feb., v. 2, No. 1, 58–66. [11 refs.] [In Greek.] French summary.

MEYERS, H. F. **Physical Observations on** *Echinococcus* **Eggs, Part II: a Simple Method for the Determination of Viability.** *J. Parasitology*. 1957, June, v. 43, No. 3, 322–3.

The occurrence of hydatid disease in rural areas of Alaska has stimulated the study of methods of rendering the eggs of *Echinococcus* spp. non-viable by chemical methods, and a method for determining their viability is therefore required. The author describes a method of

liberating live oncospheres from the eggs, referring to the earlier work on this subject by Ross (*Bull. Council Sci. Indust. Res.*, Australia, No. 40, 1929), and he suggests that the method here described may be applicable to the eggs of other tapeworms, though he has not investigated this.

E. multilocularis obtained from red foxes were fed to red-backed voles (*Clethrionomys rutilus dawsoni*) and, after the hydatid cysts had developed in the voles, the voles were fed to dogs, eggs being obtained by autopsies of the dogs. The eggs, mostly in gravid segments of the tapeworms, were kept in tap water at 5°C. and apparently none of them lost their viability.

A pepsin solution is then made by adding 0·10 gm. pepsin 1:3,000, 2·4 gm. NaCl and 0·057 gm. $Na_3\ PO_4.12H_2O$ to 300 ml. $6{\cdot}7 \times 10^{-3}$M HCl and this is brought, in a constant temperature bath, to about 38°C. To 5 ml. of this solution 1 ml. of the fluid containing the eggs is added and the mixture is incubated for 3 to 5 minutes. Then 5 ml. of a trypsin solution made by adding 1·20 gm. trypsin 1:250 and 2·4 gm. NaCl to 300 ml. of $6{\cdot}775 \times 10^{-2}$M Na_2HPO_4 are added and about 30 seconds are allowed for the free eggs to settle. About 1 ml. of the mixture is then removed from the bottom of the tube and moving oncospheres may then be seen if the eggs are viable.

The pepsin and trypsin solutions remain stable for several months at 5°C. The addition of an activator, such as sodium phosphate, to the pepsin solution is essential, but any of 20 other activators tried by the author will also serve. Among the better ones are glycine, ethylenediaminetetra-acetate, diethyldithiocarbamate and urea. Neither the time of incubation, nor its temperature is critical. Live oncospheres were obtained by incubating for 1½ to 10 minutes and at temperatures varying from 35 to 40°C., but incubation for 5 minutes at 38°C. seems to be the optimum for this system. The results eliminate the necessity for infecting mammalian intermediate hosts, but the method does not take into consideration oncospheres which may be viable but so much damaged that they are no longer infective. *G. Lapage*

Duce, A. & Carta, G. La schermografia nel "dépistage" della echinococcosi epatica. [**X-rays in the Diagnosis of Hepatic Echinococcosis**] *Boll. Schermografico*. Rome. 1957, May–June, v. 10, Nos. 5/6, 141–6, 6 figs. English summary (7 lines).

Lamma, V. Contributo alla conoscenza dell'idatidosi del polmone attraverso l'indagine schermografica. [**Observations on the Recognition of Pulmonary Hydatidosis by Means of X-ray**] *Lotta c. la Tubercolosi*. 1957, July–Aug., v. 27, Nos. 7/8, 685–9. [24 refs.]

RAPAPORT, M. & MIERES, A. Hidatidosis endoocular. [**Intraocular Hydatidosis**] *Semana Méd.* 1957, Aug. 15, v. 111, No. 7, 321–4. 3 figs. [14 refs.] English summary.

FAIRBAIRN, D. **The Biochemistry of** *Ascaris*. *Exper. Parasit.* New York. 1957, Sept., v. 6, No. 5, 491–554, 1 fig. [Numerous refs.]

ENTNER, N. **The Occurrence of the Pentose Phosphate Pathway in** *Ascaris lumbricoides*. *Arch. Biochemistry.* 1957, Sept., v. 71, No. 1, 52–61, 1 fig. [26 refs.]

KAGAN, I. G. **Serum-Agar Double Diffusion Studies with** *Ascaris* **Antigens.** *J. Infect. Dis.* 1957, July–Aug., v. 101, No. 1, 11–19, 4 figs. [20 refs.]

The author reviews the previous literature concerning the serological activity of isolated tissues and a polysaccharide fraction of *Ascaris lumbricoides* var. *suum* and shows that the technique known as "double diffusion in agar" is a useful method for the further analysis of these highly complex *Ascaris* tissue antigens. The value of this technique lies in the fact that ". . . mixtures of antigens separated by a layer of agar from a homologous antiserum will form distinct precipitation bands or lines of flocculation in the agar where antigens and antibody meet. Studies made with known mixtures of antigens against specific antiserums have indicated that each precipitin band which forms in the agar represents at least one antigen-antibody reaction". With the author's modification of the double diffusion test in 3 mm. tubes [this *Bulletin*, 1956, v. 53, 1472] and by testing various tissue fractions of pig *Ascaris* against a homologous antiserum the following results were obtained: "Whole worm antigen showed 6 antigenic components with 1:4 immune serum. Enteric fluid with full strength serum showed 10 to 14 antigens and with diluted serum 4 antigens. Muscle contains 5 to 6 antigens; 4 of which persisted on dilution; cuticle, 8 antigens, only 3 persisting on dilution; unembryonated egg, 3 to 5 antigens, 3 remaining after dilution; embryonated egg, 2 bands, which persisted on dilution; polysaccharide 4 to 8 bands, with 4 major components persisting on dilution." [When immune serum is diluted minor antibodies are lost and only the stronger antibodies persist.] Cross-reactions with three heterologous *Ascaris* species were also tested "with whole worm *Toxocara canis* antigen, 5 to 6 antigenic components cross reacted with pig ascaris antiserum. *Toxocara cati* showed 9 to 10 common antigens, and human ascaris, 8 antigens. Serum diluted 1:4 showed 4 strong antigens in dog ascaris, 3 in cat ascaris, and 3 in human ascaris". Having shown that the double diffusion method "visualizes and separates the antigenic components in the tissue antigens of pig ascaris", the author tried to determine, by means of absorption tests, the number of antigens various tissue fractions shared in common. The results of these experiments showed that "all

tissue preparations have some antigens in common. This was particularly true for enteric fluid, unembryonated egg and muscle since these fractions absorbed all but the polysaccharide antibodies from a pig ascaris antiserum. Embryonated egg had common antigens with cuticle, muscle and unembryonated egg. Polysaccharide contained some antigens found in practically all other tissues. Whether these antigens are polysaccharide or protein contaminants of the original polysaccharide antigen cannot be resolved by this absorption procedure. Cuticle and embryonated egg appeared to have the least number of common antigens since they absorbed only some of the antibodies in the serum ".

[This highly technical paper is important and interesting; it does not lend itself to further summarization and should be read in the original.]

R. M. Gordon

MORISITA, T. & MABUCHI, M. **On T.M. Reaction, a New Diagnostic Method for Ascariasis by the Precipitation Test.** *Japanese J. Exper. Med.* 1957, Apr., v. 27, Nos. 1/2, 1–4.

6 human volunteers, previously proved to be free of all helminth parasites, infected themselves with *Ascaris lumbricoides* by swallowing 8–25 embryonated eggs. The intensities of the resultant infections were then estimated in each volunteer by counting the number of eggs present in measured samples of faeces. During the incubation period, after the appearance of eggs in the faeces and subsequent to their disappearance after treatment with piperazine, antigens prepared from the patients' faeces were tested at regular intervals against immune sera obtained from rabbits previously injected with coelomic fluid removed from pig *Ascaris*. The methods used for preparing the antigens from human faeces and for obtaining the immune sera from rabbits are fully described in the text. In every instance positive precipitin reactions were recorded from the patients infected with *Ascaris*; these reactions always appeared before eggs were found in the faeces, persisted so long as eggs were present and disappeared within 2 days of the elimination of the worms by anthelmintics. When this test was applied to persons suffering from ankylostome or *Trichuris* infections, or " fluke or tapeworm diseases ", no false positives were recorded. On the other hand, a positive result was obtained when no eggs were present in the faeces and only male *Ascaris* were passed after treatment.

The authors claim that the " T.M. Reaction [presumably T. Morisita] is successfully applied for human ancylostomiasis, pin-worm and fluke diseases using the corresponding anti-serum ", but no satisfactory evidence is produced in support of this statement. *R. M. Gordon*

JELLIFFE, D. B. & JUNG, R. C. **Ascariasis in Children.** *West Indian Med. J.* 1957, June, v. 6, No. 2, 113–22.

" Present views as to the clinical picture produced by the various stages of *Ascaris lumbricoides* are reviewed, with especial relation to

hepatomegaly, intestinal obstruction and malnutrition in young children. Modern methods of treatment are described, especially single dosage therapy with piperazine compounds (70 mg./lb. body weight)."

OCAMPO, A. N., DE LEON, M. G. & DIAZ, Nenita R. **Hepatic Abscess of the Liver due to Ascariasis.** *J. Philippine Med. Ass.* 1957, Aug., v. 33, No. 8, 607–11, 5 figs.

SADUN, E. H., NORMAN, Lois & ALLAIN, Dorothy. **The Detection of Antibodies to Infections with the Nematode, *Toxocara canis*, a Causative Agent of Visceral Larva Migrans.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 562–8, 1 fig. [12 refs.]

There is reason to believe that "tropical eosinophilia" may often be due to invasion of the viscera by *Toxocara* larvae. Accordingly investigations were made in the hope of developing serological means for the diagnosis of this infection. Antigens were prepared from adult *Toxocara* worms and from the eggs. 7 rabbits were infected with eggs and 5 others were inoculated with *Toxocara* antigen absorbed onto aluminium hydroxide. The best antigen to use for precipitin tests with the bentonite flocculation technique [this *Bulletin*, 1956, v. 53, 1371] was an acid-soluble protein extract adjusted to neutrality. The sera of experimentally infected rabbits contained antibodies detected by the flocculation test 2–3 weeks after infection and so did the sera of artificially immunized rabbits. Similar results were obtained with the complement-fixation reaction. The sera of infected rabbits showed elevated gamma and alpha 1 globulins. Sera from 5 monkeys showed positive flocculation reactions at titres of 1 in 5—1 in 40, twelve and twenty months after the last time of infection.

285 sera from human beings and experimental animals with a great variety of infections were tested in order to investigate the specificity of the above reactions. Cross-reactions were seen in 31 out of 45 rabbits infected with *Ascaris lumbricoides*, but otherwise the reactions were fairly specific for *Toxocara*. On the other hand occasional discrepancies were observed, and it is considered that further information and experience are required with these tests before they can be justified for the laboratory diagnosis of visceral larva migrans. *F. Hawking*

DE ROOK, H. **Filariasis on the Island of Pam (South Waigeo District, West New-Guinea).** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 197–212, 2 maps, 5 figs. & 1 graph. [10 refs.]

Pam is a small island measuring only 1,000 × 600 metres, situated west of New Guinea in the Dampier Strait. It is flat, with a sandy

beach-ridge. The soil is highly porous and the village lies on the beach on the north-west side. The houses, on piles, are built over the sea. There are no sewage drains. The greater part of the island is covered with coconut trees under which there are countless coconut shells. The southern aspect is occupied by a large swamp with numerous pandanus trees. Fish are abundant. There are some dogs, cats and poultry.

The entire population consists of 250 people, all born and bred on the island, and all were examined for microfilariae. The periodicity is nocturnal and smears (approximately 15 cmm.) were taken from the ear between 8 and 10.30 p.m. The microfilaria rate was 26·8%, the filarial disease rate 14·8%, and the average number of microfilariae per infected person was 37 in 15 cmm. of blood. The species was *Wuchereria bancrofti*. On the whole, microfilaraemia was higher in people with filarial disease and the infection rate with genital affections was higher than in those with elephantiasis. The incidence of the latter was 9·5% of adults. Fibrosis of the testicles was not uncommon. As in other areas where similar surveys have been carried out microfilaraemia was higher in males than in females, though the incidence of elephantiasis of the legs was equal in both sexes and the incidence of filarial disease increased progressively with age. The incidence of filarial infection and that of filarial disease increased progressively with age and the highest rate is reached in the age-group of 41–50 years. However, two cases of marked elephantiasis were recorded in girls in their second decades.

Four mosquito vectors were found, and it is concluded that their relative importance differs greatly. The natural infection of *Anopheles farauti* is very high (41%) and the rate of infective-stage larvae extremely so. It is undoubtedly the chief vector in Pam. Full development takes place in 11–13 days. This insect bites inside houses at night in large numbers. In *Aëdes kochi* the natural infection rate and the infective stage rate were lower, though this species proved very susceptible. It, too, is a nocturnal biter, especially in the earlier hours of the night. *Culex annulirostris* is of minor importance and has a low natural infection rate, although it attacks man indoors. *Culex fatigans* proved very hospitable to bancroftian larvae, but because of its low prevalence it fails to play an important part in transmission in Pam.

The swamp provides the most important breeding place of *A. farauti* and *C. annulirostris*. *Aëdes kochi* breeds in the leaf axillae of pandanus, and *C. fatigans* only in artificial water containers. The most prevalent mosquito is *Aëdes scutellaris* breeding in coconut shells. This species attacks in the daytime inside houses in large numbers and, though it was determined as the result of dissection of 23 individuals that the infection rate, based on finding infective larvae, was 4% (as against 6·6% for *A. farauti*), its importance as a vector was not considered great.

The high endemicity of filariasis in Pam with its numerous pandanus trees coincides with the opinion of others that major filariasis occurs only in localities where these grow near human habitations.

[The results of this survey are especially important insofar as they are particularly complete in such a small restricted area in this island where all the factors can be observed and controlled. As regards the insect vectors it is to be noted that the infective rates lose some of their scientific importance when it is realized that all figures are based on wild-caught insects and that the possibility of infection with ornithofilariae, bat filariae or even with dirofilariae was not excluded.]

Philip Manson-Bahr

RACHOU, R. G. Transmissores da filariose bancroftiana no Brasil. [**Transmission of** *Wuchereria bancrofti* **in Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1956, Jan., v. 8, No. 1, 267–79. [21 refs.] English summary.

A review of 30 entomological surveys carried out by the National Service of Malaria in Brazil between 1951 and 1955, and involving a total of 93,485 mosquito dissections, indicated *Culex pipiens fatigans* as the principal vector of *Wuchereria bancrofti*. Of 90,264 specimens of this species dissected, 2,632 were infected with larvae and 243 contained infective larvae. Transmission occurs mainly inside houses, but in some areas vector density is sufficiently high for outdoor transmission.

Anopheles darlingi, *A. tarsimaculatus* (= *A. aquasalis*), *A.* (*Kerteszia*) *bellator* and *Culex* sp. (not *C. p. fatigans*) were also found infected with *W. bancrofti* in Santa Catarina. *Aëdes scapularis* was suspected as a vector on the basis of a filarial infection, but the identity of the parasite was not proven.

N. R. Phillips

LIMA, M. M., FERREIRA NETO, J. A. & RACHOU, R. G. Do ciclo evolutivo do *Culex pipiens fatigans* em condições experimentais: I. Fase de ôvo. [**Developmental Cycle of** *Culex pipiens fatigans* **under Experimental Conditions—I. The Egg Phase**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1956, Apr., v. 8, No. 2, 373–7. English summary.

Culex pipiens fatigans is the principal vector of *Wuchereria bancrofti* in Brazil. A total of 240 ovipositions, at the rate of 20 per month for 12 months, was observed; all ovipositions were nocturnal. 37,340 eggs were laid, representing an average of 156 per oviposition; minimum and maximum numbers of eggs per oviposition were 53 and 264, respectively, and about 80% of batches comprised between 100 and 200 eggs. Humidity, rather than temperature, appeared to control oviposition.

Of the 240 ovipositions, 239 (99·6%) were fertile, and 35,767 of the 37,340 eggs (95·8%) hatched. Among the fertile ovipositions, proportions of eggs hatching per oviposition varied between 15·9 and 100%; hatching was 100% in 81 (33·8%) of the 239 fertile batches. Some eggs, although fertile, failed to hatch.

Duration of the egg phase averaged 2·2 days; 10,452 eggs (29·2%) hatched in 1 day, 13,339 (37·3%) in 2 days, 7,738 (21·6%) in 3 days, 2,482 (6·9%) in 4 days, and 1,756 (4·9%) in 5 days. Hatching occurred sooner in summer (average 1·2 days, mean temperature 25·5°C.) than in winter (average 3·3 days, mean temperature 18·5°C.). *N. R. Phillips*

LICHTENBERG, F. & MEDINA, R. **Bancroftian Filariasis in the Etiology of Funiculoepididymitis, Periorchitis and Hydrocele in Puerto Rico (Statistical Study of Surgical and Autopsy Material over a 13-Year Period).** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 739–51, 4 figs. & 3 graphs. [32 refs.]

A high incidence of funiculoepididymitis, periorchitis and hydrocele has always been observed in Puerto Rico. While some workers estimate that 80% of hydrocele is filarial, there is a growing conviction that filariasis is decreasing and that elephantiasis has become rare.

From a study during a 13-year period from January 1940 to December 1952, 1,531 autopsies and 43,087 surgical specimens showed that funiculitis with or without epididymitis was present in 11 autopsies and 43 surgical cases; hydrocele and periorchitis in 138 autopsies and 189 surgical cases. In the hydrocele group all cases in which fluid over 10 cc. was present are included.

Hydrocele, lymphocele, haematocele, pyocele and adhesive periorchitis are considered as related lesions.

Filarial funiculitis with or without epididymitis was present in 3 autopsies and 15 surgical cases, filarial hydrocele or periorchitis in 12 autopsies and 36 surgical cases, a solitary filarial lesion of the testis was found only in 2 autopsies in whom single calcified filariae were demonstrated.

The high incidence of the lesions mentioned above is related to multiple aetiological factors rather than to filarial infection alone. Filariae were found at autopsy in the intrascrotal organs in 3·9% and in all locations in the body in 4·4%, an incidence similar to that of microfilaraemia in comparable groups.

There were also severe lesions, usually presenting mixed or complicated aetiological factors, such as thrombophlebitis, bacterial superinfection or testicular damage.

The subject is fully discussed, with reference to the literature.

Philip Manson-Bahr

BIAGI F., F. & CASTREJON, Olga. Observaciones sobre mansonelosis en la Peninsula de Yucatán. III. La fórmula leucocitaria. [**Studies on** *Mansonella ozzardi* **Infection in the Yucatán Peninsula, Mexico. III. The Leucocyte Count**] *Medicina.* Mexico. 1957, Mar. 25, v. 37, No. 768, 125–8, 1 fig. [14 refs.]

The English summary appended to the paper is as follows:—

"Leukocytic formulae were made in blood smears of 171 persons with microfilariae and 114 without Mf. of *Mansonella ozzardi*, all of whom were from the same community.

"This filariasis produces eosinophilia which seems to be more intense and constant during the first months or years following the infection. A small number of old persons with mansonellosis may show normal eosinophile percentage. Highest figure of eosinophiles found was 38 per-cent.

"Frequently eosinophilia is found in persons without Mf." We believe that this finding would be used as a global endemic index in helminthiasis.

"When the Mf. die they usually are surrounded by leukocytes, mainly eosinophiles."

[See this *Bulletin*, 1957, v. 54, 465.]

MAZZOTTI, L. & PALOMO, E. **A Note on the Survival of the Microfilariae of** *Mansonella ozzardi*. *Bull. World Health Organization*. Geneva. 1957, v. 16, No. 3, 696–9.

Three experiments were made in which blood containing the microfilariae of *M. ozzardi* was transfused into persons free from this parasite. The first subject, A, received 250 ml. blood containing 800,000 microfilariae. Soon after the transfusion his blood showed 80 microfilariae per ml. as measured by Knott's concentration method. 7 months later there were still about 70 microfilariae per ml. and 2 years later there were about 3 microfilariae per ml. (He then died of dysentery.) The second subject, F, received 100 ml. of blood containing 120,000 microfilariae. Soon after transfusion his blood showed 6 microfilariae per ml. These persisted in gradually diminishing numbers, the microfilariae being seen for the last time 3 months after transfusion. The third subject, L, received 150 ml. of blood contaning 45,000 microfilariae. Shortly after transfusion his blood showed 5 microfilariae per ml. and these gradually diminished in number, microfilariae being seen for the last time 27 months after transfusion.

Apparently the microfilariae of *M. ozzardi* can live more than 2 years after transfusion. *F. Hawking*

BAUER, H., BISCHOFF, A., HANSEN, J. & MAGUN, R. *Loa loa* Filariosis mit cerebralen Komplikationen als Berufskrankheit. [**Loiasis with Cerebral Complications as an Occuptional Disease**] *Arch. f. Gewerbepath. u. Gewerbehyg.* 1957, v. 15, No. 5, 429–39, 3 figs. [Numerous refs.]

The subject of this detailed report was a German sailor of 45 years who, travelling widely in his career, had visited in 1952 many West African ports from Dakar to Duala and had occasionally sailed up estuaries of

several rivers in these parts. Towards the end of 1952 he fell and injured his forehead at sea. In the following year Calabar swellings made their appearance. Early in 1954 he showed signs of incoordination and paraesthesia of the right hand. The neurological picture was that of an angular gyrus syndrome with alexia (word blindness), apraxia (loss of understanding) and stereognostic phenomena, also a right-sided hemianopsia and an ill-defined facial palsy, and some complicated psychological disturbances. These were investigated by extensive, minute and exacting neurological methods, including electro-encephalograms and biochemistry of the cerebrospinal fluid. After an interval of 8 months, *Loa loa* filariasis was diagnosed by serological reactions as well as by demonstration of microfilariae in the blood and, finally, by excision of a female adult *Loa loa* (4·5 cm. in length) from a Calabar swelling on the right elbow. All this occurred at intervals of 2–4 years subsequent to a possible infection with this parasite in West Africa.

More difficult still has been to decide upon the genesis of the cerebral episode in the summer of 1954. That such an accident may supervene had been accepted by RODHAIN as possibly due to reactions to the presence of the adult worm, allergic manifestations or even organized reaction from plugging of small blood vessels with microfilariae [this *Bulletin*, 1950, v. 47, 61]. Finally it was decided that the cerebral disturbance was attributable to local allergic inflammation. It is based upon the facts that there was a high-grade eosinophilia varying from 40 to 57% and a strong positive complement fixation. It is also claimed that this is the first occasion on which the Prausnitz-Küstner reaction has been demonstrated; the patient's serum was injected subcutaneously into a normal person; some 48 hours later an antigen solution (*D. immitis* extract) in strengths of 1 in 1,000 and 1 in 10,000, was injected subcutaneously into the same person, and this gave rise to a severe local reaction (effectively illustrated by a photographic figure).

It is therefore claimed that these phenomena are indicative of an allergic basis for the cerebral episodes which this man manifested. The diethylcarbamazine treatment was successful in clearing up the Calabar swellings and the brain lesions. *Philip Manson-Bahr*

BULL. WORLD HEALTH ORGANIZATION. Geneva. 1957, v. 16, No. 3, 485–551, 6 figs. [Numerous refs.] **Onchocerciasis. Epidemiology —Pathogenesis, Chemotherapy, Vectors—Control.**

This is a selection from the papers presented at the WHO African onchocerciasis conference in 1954. R. KIRK and F. C. RODGER write on the ocular aspects, B. DE MEILLON and J. R. DE LEÓN on entomology, M. H. SATTI and R. KIRK on chemotherapy, J. P. MACMAHON on the technique of using DDT against *Simulium*.

The ocular manifestations of onchocerciasis are divided into anterior and posterior lesions. Kirk's observations in the Sudan have shown an

apparent correlation between the incidence of ocular lesions and distance from a *Simulium* breeding ground; this is probably more important than nutritional and racial differences between tribes differently affected. It is generally agreed that anterior lesions are associated with the presence of microfilariae in the eye, which seem to cause damage only when they die. Anterior lesions are protean; keratitis, nummular and general, iritis, iridocyclitis, haze in cornea and anterior and posterior chambers, corneal opacities, deformity of pupil, secondary glaucoma. Both authors state definitely that cataractous changes, dislocation, even complete absorption of the lens may take place. Rodger improved the vision of 4 out of 8 typical subjects with massive vitamin A therapy. He points out that another cause of small opacities, easily mistaken for onchocerciasis, is corneal herpes, a common sequela of malaria. "There should no longer be any doubt that as a general rule the corneal opacity when present in an otherwise healthy eye is not related to the disease. . . ."

Posterior lesions are usually bilateral. Night blindness is a common early symptom; Kirk believes that the myriads of microfilariae compete successfully with their host for marginal quantities of nutritional factors. Microfilariae have been demonstrated in the posterior segment, but though posterior lesions are beyond doubt closely associated with onchocerciasis, they appear to be toxic in nature. No form of treatment improves them, but Rodger points out that rapid killing of microfilariae with diethylcarbamazine does not make them worse.

De Meillon's paper is a closely written summary of the existing information on *Simulium*, and can hardly be summarized further. Of four acknowledged main sources of his information on *S. damnosum*, three have been abstracted in this *Bulletin* [Wanson *et al.*, 1950, v. 47, 647 and Lewis, 1949, v. 46, 404 and 1953, v. 50, 543]. Two species only, *S. damnosum* and *S. neavei*, are known vectors. A third species, *S. renauxi*, is now regarded as a synonym of *S. neavei*. The lack, even now, of precise information on some important facets of the bionomics of *Simulium* emerges: flight range, length of life, method of surviving the dry season are all uncertain. The author comments "It seems . . . that resistance to desiccation by stranded pupae has not been sufficiently investigated".

Evidently the larval stage is particularly dependent on temperature. Other notable points are that first stage larvae are carried downstream in large numbers, thus disseminating their species, and that their method of feeding concentrates suspended matter in the larval gut, thus accounting for the minuteness of the DDT dose required for effective control.

At the north and south extremes of its range *S. damnosum* is not anthropophilic.

S. neavei is spoken of as a complex; *S. renauxi* is not now considered a separate species, but *S. woodi* and *S. nyasalandicum* have not been fully investigated. Sources of his information already abstracted in this *Bulletin* are McMahon, 1952, v. 49, 73; Geukens, 1951, v. 48, 825;

WANSON, 1953, v. 50, 136; WANSON and HOLEMANS, 1951, v. 48, 826. It is well known that the flight range of *S. neavei* is nothing like so great as that of *S. damnosum*; nevertheless, in one area Wanson found 50% with larvae, 10% infective. "It appears . . . that in those places where the two occur together *neavei* is of greater importance."

De León states that of the 3 vectors in Guatemala, *S. ochraceum*, *S. metallicum* and *S. callidum*, the first is far the most important. Besides being the only predominantly anthropophilic species, it is the only one that prefers the high altitudes at which onchocerciasis is found in Guatemala. The seasonal prevalence of Simuliidae is highest in December. In 40,000 dissections of flies, metacyclic forms were found with striking predominance in the Malpighian tubules, less often in thorax and abdomen, never in the proboscis.

Satti and Kirk describe attempts to treat onchocerciasis with Antrypol, Pentostam [sodium stibogluconate] and diethylcarbamazine. Antrypol was given in courses equivalent to a total of 10 gm. per adult, by various dosage schemes, all of which proved alarmingly toxic. [The reaction of onchocerciasis subjects to this drug is extremely variable; even the same worker may find different results with the same course in different parts of the same country. One conclusion only can be drawn definitely, namely that a total of 5 gm. per adult is the maximum safe course in field conditions.] 11 subjects were treated with Pentostam, dosage varying from 60 ml. to 240 ml. One subject, given 6 ml. daily for 10 days, showed marked improvement of vision. 3 subjects were treated with diethylcarbamazine. The authors discuss diethylcarbamazine treatment in the light of the work of MAZZOTTI, this *Bulletin*, 1952, v. 49, 74 [several other papers by this author have been abstracted], BURCH and ASHBURN, *ibid.*, 1952, v. 49, 74; HAWKING and LAURIE, *ibid.*, 1949, v. 46, 1065; and PUYUELO, *ibid.*, 1951, v. 48, 182.

Most of MacMahon's paper is taken up with precise details of the estimation of water discharge in a river, and calculation of DDT quantities required for dosing; this cannot be abstracted. He gives the approximate breeding cycle (of *S. neavei* presumably) as 10 days, and the minimum dosage of DDT as 0·5 p.p.m. over a period of 30 minutes, every 10th day for 3 months. *B. B. Waddy*

DÍAZ A., F. **Notes and Observations on Onchocerciasis in Guatemala.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 676–81. [Refs. in footnotes.]

McMAHON, J. P. **Notes on the *Simulium neavei* Group of Simuliidae with particular reference to *S. nyasalandicum* and *S. woodi*.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 607–17, 7 figs. [16 refs.]

Extensive work in western Kenya on the distribution of *Simulium neavei* with its phoretic association in the immature stages with the

fresh-water crab, *Potamonautes niloticus* [this *Bulletin*, 1952, v. 49, 984], revealed that the larvae and pupae of two other simuliids, *S. nyasalandicum* and *S. woodi*, also occurred on this crab. In *S. nyasalandicum* they occur, as for *S. neavei*, on the outer surface of the crab, but those of *S. woodi* are in the exhalant passages of the branchial chamber. The adults of *S. nyasalandicum* and *S. neavei* are very similar, but there are minor differences in the females and the male genitalia are distinctive. There are differences in the mentum of the larvae; the pupae are identical. The adults of *S. woodi* are more easily distinguishable from the other two species on external features, besides the male genitalia. Larval differentiation of *S. woodi* is done from the mentum. The pupal respiratory organ is much longer in *S. woodi* than in the other species and the cocoon is characterized by coarse dark fibres irregularly woven into its matrix. Text and figures detail the distinctive feature of adults and give the first descriptions of the immature stages.

S. nyasalandicum has very occasionally been taken biting man but there is little evidence to suggest it could be a vector of human onchocerciasis. Its normal host is unknown. It is widely distributed from 4,000 to 5,000 ft. but not always present with the crab; cascades and waterfalls are also essential. *S. woodi* is also widespread with a preference, which is less marked with *S. nyasalandicum*, for open sunlit conditions rather than forest and shade. The host of the adult is not known. *D. S. Bertram*

LEWIS, D. J. **Simuliidae and their Relation to Onchocerciasis in the Sudan.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 671–4.

ZURETTI, S. Les simulies et l'onchocercose en Somalie. [*Simulium* **and Onchocerciasis in Somalia**] *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 674–6.

AUGUSTINE, D. L. **The Pathogenicity of** *Onchocerca volvulus* **in relation to Lymphadenopathy and Elephantiasis.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 665–9. [Refs. in footnotes.]

MARKELL, E. K. & TURNER, J. **Cortisone and Prednisone in the Suppression of Allergic Reactions to Diethylcarbamazine Treatment of Onchocerciasis.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 546–52.

Previous studies had shown that cortisone diminished the acute allergic inflammations of the skin which occur in Central American onchocerciasis

either spontaneously or because of treatment with diethylcarbamazine. 4 patients in Guatemala, who were liable to such attacks, were given cortisone 25 mgm. 4 times daily during an acute attack, or for 2 days previous to, and during the administration of, diethylcarbamazine. As a result the allergic reactions were cut short or prevented from appearing. In view of these results, a larger trial was carried out on a plantation where there was much onchocerciasis.

40 patients with many microfilariae in the skin were each given diethylcarbamazine 50 mgm. 4 times daily for 4 days; on the 5th day some patients received double this dose. The first group of 19 patients also received 5 mgm. of prednisone with each dose of diethylcarbamazine plus 2 preliminary doses of 5 mgm. on the day before treatment began. After 3 days of treatment, 9 of the patients were given a placebo instead of prednisone. The second group of 21 patients received a placebo instead of prednisone. In the group without prednisone there were 9 persons with moderate and 7 with severe reactions; in the group with prednisone there were 3 patients with moderate reactions and only 1 with a severe reaction. Termination of the prednisone treatment on the 4th day of treatment with diethylcarbamazine did not lead to any undesirable reaction. Similar results were obtained when 10 persons without microfilariae in the skin were treated with diethylcarbamazine plus prednisone and 10 others were treated with diethylcarbamazine alone. Judging by skin biopsies, the prednisone did not interfere with the microfilaricidal action of the diethylcarbamazine. *F. Hawking*

VARGAS, L. & TOVAR, J. **Resistance of** *Onchocerca volvulus* **Microfilariae to Diethylcarbamazine.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 682–3. [Refs. in footnotes.]

UEKI, T. [**Experimental Studies on the Third Stage Larva of** *Gnathostoma spinigerum*] *Igaku Kenkyu.* Fukuoka. 1957, June, v. 27, No. 6, 1191–6. 24 figs. on 3 pls. [In Japanese.] English summary.

LIPKOVÁ, V. O možnosti asanácie uzavretých priestorov detských kolektívnych zariadení od vajíčok geohelmintov. [**Concerning the possibilities of Sanitation of Closed Spaces in Collective Institutions for Children with Respect to Geohelminthic Ova**] *Českoslov. Hyg.* Prague. 1957, v. 2, No. 5, 313–20. [20 refs.]

The English summary appended to the paper is as follows:—

"We have tested the method of a laboratory cultivation of the ovum of Ascaris lumbricoides, Trichuris trichiura and Enterobius vermicularis.

"We have tested the effect of several currently used disinfectants upon the ova of Ascaris lumbricoides, Trichuris trichiura and Enterobius

vermicularis. We have stated that disinfectants in solution, such as Ajatin, Ryfen, o-cresol, liquor cresoli saponatus, phenol, chloride of lime and chloramine have no disinfectant effect in an exposure period less than 15 minutes upon the ova of Ascaris lumbricoides and Trichuris trichiura in the tested concentrations.

"The ova of Enterobius vermicularis are destroyed (in 100%) by the following disinfectants:

"a) Liquor cresoli saponatus in a 10% solution in 5 minutes exposure time.

"b) Phenol in a 7% solution in 7 minutes exposure time.

"c) Chloride of lime (25% of active chlorine) in a 3% solution after 5 minutes.

"d) Chloramine (24% of active chlorine) in a 4% solution after 5 minutes.

"The other disinfectants we have tried did not destroy the ova of Enterobius vermicularis in 100% in less than 15 minutes. For the practical disinfection of the ova of Enterobius vermicularis in closed spaces of collective institutions for children, we esteem chloride of lime and chloramine to be the most appropriate due to their disinfection qualities, to the economy and to the safety in working with them."

GOODCHILD, C. G. *Trichinella spiralis* **Infections in Thiry-Vella Fistulated Rats.** *J. Parasitology.* 1957, June, v. 43, No. 3, 294–303, 8 figs. on pl. & 1 text fig. [12 refs.]

The author refers to earlier work on the nutrition of *Trichinella spiralis*, *Hymenolepis diminuta* and the dog hookworm, *Uncinaria stenocephala*, the basic problem being to determine which nutrients are obtained by the parasite from the host and which from the contents of the host's intestine. For the work described in this paper the author placed larvae of *T. spiralis*, 4 weeks old and obtained by peptic digestion of infected rats, in Thiry-Vella [intestinal] fistulae made in rats. The earlier use of these fistulae for the study of the nutrition of *H. diminuta* and *U. stenocephala* is quoted and the author discusses the technique of the method, the care of the fistulae and methods of preventing the rats from infecting them by licking their openings. The paper itself should be read.

Larvae put by the author in these fistulae established themselves there and infected most of the 35 rats in whose fistulae about 200 larvae had been implanted. A table shows that the numbers of larvae recovered by digestion from these rats varied from 0 to 8,730, but larger numbers of larvae were recovered from the skeletal muscles of rats infected by the mouth with the same number of larvae (200). Both male and female *T. spiralis* completed their development in the fistulae and became sexually mature and copulation occurred, sperm being present in the uteri of the gravid females. Some adults had their anterior ends buried in the mucosa of the fistulae; some were lying alive in contact with the

fistulae; others were dead in the copious mucus in the fistulae. The growth of these adults was, however, stunted; sexually mature males were hardly longer than the larvae, the largest average size being 1·2 mm., while the largest average size of the females was 2·4 mm. The times taken to reach the various stages are given. The author concludes that the males reached sexual maturity without growth, but that the females grew "slightly". Histologically, however, both males and females seemed to be completely normal. They are illustrated in a plate.

The larvae produced by the females in the fistulae were normally infective to rats when they were given by the mouth and they produced normal infection of the muscles of these rats. *G. Lapage*

LARSH, J. E., Jr. & GOULSON, H. T. **The Effectiveness of Cadmium Oxide against *Trichinella spiralis* in Mice.** *J. Parasitology.* 1957. Aug., v. 43, No. 4, 440–45.

"Medicated feed in pellet form containing 0·015% cadmium oxide was shown, by various feeding schedules in mice, to produce a striking reduction in the number of adults and larvae of *T. spiralis* recovered after a single infection. An even greater effect was shown in the reduction of adult worms recovered from mice after 1 reinfection. The results encourage the testing of this chemical against *T. spiralis* in swine."

DEFICIENCY DISEASES

See also p. 86, McFADZEAN & WEBB, **Trace Element Deficiencies in Gambia.**

MATSANIOTIS, N. S. **Studies on Protein Metabolism in Undernourished Infants and Children.** *J. Pediatrics.* St. Louis. 1957, Sept., v. 51, No. 3, 267–84, 4 figs. [52 refs.]

This paper records the changes in amino-nitrogen levels in healthy and undernourished infants and young children after (a) ingestion of calcium caseinate, (b) ingestion of casein hydrolysate, and (c) intravenous administration of casein hydrolysates. The changes in the amino-N levels were the same in the two groups. It is concluded that proteolytic activity in the gastro-intestinal tract was equally effective in the two groups and it is suggested that formulae consisting of predigested protein are not necessary in the feeding of undernourished infants.

R. Passmore

SIMIĆ, B. S., ATANACKOVIĆ, V. B., DJIVANOVIĆ, B. B. & BABIĆ, B. J. Prilog izučavanju kwashiorkor-a na Kosmetu. [**A Contribution to the Investigation of Kwashiorkor in Kosmet (South Serbia)**] *Higijena.* Belgrade. 1957, v. 9, Nos. 2/3, 110–24, 1 graph. [31 refs.] English summary.

No typical kwashiorkor was found in 350 children, but conditions defined as "pre-kwashiorkor" were found.

HAEMATOLOGY

MCFADZEAN, J. A. & WEBB, R. A. **Trace Element Deficiencies in Gambia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 425–8.

The authors observed that by European and American standards the haemoglobin level of the population in Gambia is low but can generally be raised by the administration of pharmaceutical iron preparations. Yet local cereals have an iron content greater than normal and the drinking water contains about 11 mgm. of iron per litre in the ferrous form. It was, therefore, possible that the effect of the pharmaceutical iron compounds was due to their content of other essential elements such as copper, manganese or cobalt which are known to play a part in the formation of haemoglobin. Furthermore, deficiencies of these elements had been demonstrated in the soil in Gambia. To examine the effect of trace metals the author divided 200 schoolchildren into 4 groups of 50. The first (control) was given citric acid. The second, analytically pure ferrous sulphate, and the third, chemically pure iron plus trace elements: copper sulphate, cobalt chloride, manganese sulphate and zinc sulphate. The fourth group was treated with trace elements alone. The experiment lasted for 5 weeks. At the end of these 5 weeks no significant difference between the 4 groups was seen.

The authors point out that although it was not possible by the technique they employed to demonstrate trace element deficiencies, this does not mean that such deficiencies do not occur and further investigations are warranted. *H. Lehmann*

SARIN, L. R. & MEHTA, S. R. **Observations on Etiology and Nature of Anemia in Rajasthan. A Report based on Investigations and Study of 100 Cases.** *Indian J. Med. Sci.* 1957, Sept., v. 11, No. 9, 733–7. [19 refs.]

"The investigation and study has been performed on 100 unselected cases presenting with anemia. The major etiological factors found were: hookworm 26 per cent, nutritional 13 per cent, post-malarial and hypersplenism following malaria 14 per cent, post-hemorrhagic due to piles,

epistaxis, hemorrhagic disease, uterine bleeding 29 per cent, intestinal amebiasis and dysentery 7 per cent, amebic abscess 2 per cent, chronic infections and sepsis 3 per cent, nephritis 2 per cent, cirrhosis of liver 3 per cent, Addison's disease 1 per cent, aplastic 1 per cent, myxedema 1 per cent.

"The most significant observation is that we usually do not come across a clear cut case with single etiology. There are usually multiple factors contributing to the etiology. Malnutrition, worm infestation and malaria were found to be the commonest factors."

GREIG, H. B. W. & METZ, J. **The Periodic-Acid-Schiff Reaction as a Diagnostic Aid in Thalassaemia.** *South African J. Med. Sci.* 1957, May, v. 22, No. 1, 7–12, 5 figs. on pl.

The authors have followed up the work of ASTALDI *et al.* (*Acta Haematol.*, 1954, v. 12, 145) who noted that the cytoplasm of a number of normoblasts was stained by periodic acid Schiff stain when they examined bone-marrow from patients with thalassaemia major, but not when the smears came from normal people or from those with thalassaemia minima. In the present investigation no stained granules were found in the normoblasts from normal persons, in iron deficiency anaemia (4 cases), megaloblastic anaemia including pernicious anaemia, "nutritional" megaloblastic anaemia, and puerperal megaloblastic anaemia (12), acquired haemolytic anaemia (6), homozygous sickle-cell anaemia (1), chronic myeloid leukaemia (3), and congenital hypoplastic anaemia (2). Astaldi *et al.* had actually seen a few stained granules in one case of myeloid leukaemia. Positive findings were made in 3 patients with thalassaemia major, in 1 with microdrepanocytic disease (the heterozygous state for sickling and thalassaemia), and in 2 definite and 1 possible patient with Guglielmo's disease (erythraemic myelosis). It seemed that the granules in erythraemic myelosis were more diffuse than in thalassaemia, but the original suggestion that the difficulty of differential diagnosis between the two conditions might be overcome by the use of the periodic acid Schiff stain could not be maintained.

[Of some interest is the fact that the patient with microdrepanocytic disease is the same which was described as an instance of sickle-cell anaemia by ALTMANN in 1945 (this *Bulletin*, 1945, v. 42, 652). This patient was 33 years old in 1957, and this is another example of the need to reinvestigate with modern methods alleged instances of sickle-cell anaemia in adults.] *H. Lehmann*

BESSIS, M. L'apport de la microscopie électronique à l'étude des anémies. [**The Application of Electron Microscopy to the Study of Anaemias**] *Bruxelles-Méd.* 1957, Sept. 15, v. 37, No. 36, 1321–36, 12 figs. [19 refs.]

This article which is remarkable for its beautiful photographs has two parts:—a study of sickle-cells, and the demonstration of iron in normal and abnormal red cells. Sickling affects the cell membrane as well as the haemoglobin of the cell. When sickling occurs, stripes about 1–2 μ long and 0·1 μ wide are formed on the surface of the red cell, even before the cell assumes the sickling shape. This is quite different from what is seen in other red cells when intracellular crystallization of the haemoglobin is induced. The author has photographed the iron granules in siderocytes and has shown that they measure from 20–100 Angströms. These granules disappear when the cells mature but they are still frequently seen in reticulocytes. A scheme demonstrates the incorporation of iron granules into erythroblasts in which the cells of the reticuloendothelium are taking an active part. No iron granules are found in the erythroblasts and erythrocytes of hypochromic anaemia of iron deficiency, but in haemochromatosis, or when there is a surplus of iron following medication or transfusion, much iron accumulates in the erythroblasts. Formed iron is seen in the hypochromic red cells of Cooley's anaemia. This is yet another demonstration that the hypochromia of Mediterranean anaemia is not due to an iron deficiency but to an inability of the cells to utilize iron for the formation of haemoglobin.

H. Lehmann

ZELICKSON, A. S. **Leg Ulcers associated with Mediterranean Anemia (Thalassemia Major and Minor).** *Arch. Dermat.* 1957, Sept., v. 76, No. 3, 351–6, 2 figs. [15 refs.]

"The literature on Mediterranean anemia is reviewed.

"The association of leg ulcers and Mediterranean anemia occurring in a Chinese man is reported.

"The clinical and histopathologic features of the ulcer are discussed.

"In this case, pinch-grafting of the ulcer was beneficial."

SHUKLA, R. N. & SOLANKI, B. R. **Inherited Chronic Hemolytic Anemia. Interaction of Hemoglobin 'S' with Thalassemia. Case Reports.** *Indian J. Med. Sci.* 1957, Sept., v. 11, No. 9, 722–7, 3 figs. (1 on pl.). [16 refs.]

"Two cases of chronic microcytic hypochromic anemia, attributed to interaction of hemoglobin 'S' with thalassemia gene, in a Maratha Kunbi family are reported. The variations in the severity of the syndrome have been discussed.

"The role of paper electrophoresis and alkali denaturation technique in abnormal hemoglobinopathies is emphasised."

HOOK, E. W., CAMPBELL, C. G., WEENS, H. S. & COOPER, G. R. *Salmonella* **Osteomyelitis in Patients with Sickle-Cell Anemia.** *New England J. of Med.* 1957, Aug. 29, v. 257, No. 9, 403–7. 2 figs. [25 refs.]

"There is an increased occurrence of salmonella osteomyelitis in patients with sickle-cell anemia. The clinical features of 3 cases of salmonella osteomyelitis and 1 case of salmonella bacteremia encountered in a study of 36 consecutive cases of sickle-cell anemia are presented."

See also p. 7, ALLISON, **Malaria in Carriers of the Sickle-Cell Trait and in Newborn Children.**

See also p. 51, ANDRÉ & ANDRÉ-GADRAS, Étude des rapports entre la sicklémie et la lèpre. [**Study of a Relation between Sickling and Leprosy**]

VENOMS AND ANTIVENENES

REID, H. A. **Snake-Bite and its Treatment.** [Correspondence.] *Lancet.* 1957, Oct. 5, 697.

This correspondent, from Malaya, who has considerable experience of snakes and their bites [this *Bulletin*, 1956, v. 53, 1271; 1957, v. 54, 747], refers to recent correspondence [see, for example, *Lancet*, 1957, July 27, 192; see also this *Bulletin*, 1957, v. 54, 1460] in which attention was called to "the exaggeration of danger to human beings from snake-bite" in Britain.

Among 443 persons in Malaya bitten by potentially lethal snakes in 1955–56 at least one-third had no significant symptoms of poisoning, and severe poisoning occurred in only 16%. These last cases should be treated as medical emergencies, for the results may be very unpleasant and even fatal. It is usually possible to recognize this minority clinically at an early stage and Dr. Reid hopes to demonstrate this in future publications. The majority of bites, he confirms, require only simple treatment: but he does not advocate injection of carbolic soap. It is unlikely that such a procedure would be helpful to persons bitten by *Vipera berus*: indeed, AHUJA & GURKIRPAL SINGH [*ibid.*, 1955, v. 52, 823], who suggested this treatment as a result of animal experiments, pointed out that it only detoxified cobra and krait venoms and had no

action on that of Russell's viper. In the treatment of bites in human beings " it would almost certainly do more harm than good ".

H. J. O'D. Burke-Gaffney

CANTORE, G. P. & BETTINI, S. Trasmissione del potere immunitario anti-*Latrodectus* dalla madre al feto. [**Transmission of anti-*Latrodectus* Immunity from Mother to Foetus**] *Riv. di Parassit.* Rome. 1957, July, v. 18, No. 3, 206–7.

TOXOPLASMOSIS

WRIGHT, W. H. **A Summary of the Newer Knowledge of Toxoplasmosis.** *Amer. J. Clin. Path.* 1957, July, v. 28, No. 1, 1–17. [35 refs.]

GARVEN, Alison. **Toxoplasmosis: the Diagnosis of Clinical and Latent Infection in Australia.** *Australasian Ann. of Med.* 1957, May, v. 6, No. 2, 141–4, 1 fig. [16 refs.]

Although isolated cases of toxoplasmosis have been recognized in Australia since 1946 [see, for example, this *Bulletin*, 1947, v. 44, 624; 1953, v. 50, 157; 1956, v. 53, 1479], it is well known that subclinical cases are commoner than overt infections. After a brief survey of the clinical and diagnostic features of the disease, the author, from Melbourne, describes an investigation of latent toxoplasmosis in Australia. The dye test was used as a screening procedure and sera were obtained from 1,000 persons who included blood donors, hospital patients, National Service recruits and children from a children's hospital. The technique used is described. A table shows that the percentage of positive results increased from 8% at years 0–9, to 18% at years 10–19: thereafter it rose to 25% at years 20–29 and then to 32% where it tended to remain. Some 70% of the results were in the titre range of 1 in 8 to 1 in 32, while a few reached 1 in 256.

The significance of the results, which are similar to the figures obtained by BEVERLEY *et al.* in England [*ibid.*, 1954, v. 51, 977] is discussed. The possibility is put forward that in some areas wild and domestic animals are a source of infection. The importance of carrying out the complement-fixation test in suspected cases is emphasized.

H. J. O'D. Burke-Gaffney

DERMATOLOGY AND FUNGUS DISEASES

MABERTI, S. & BORELLI, D. Un micetoma podal por *Madurella mycetomi* en Venezuela. [**Mycetoma Pedis caused by** *Madurella mycetomi* **in Venezuela**] *Gac. Méd. de Caracas.* 1956, June–Sept., v. 64, Nos. 6, 7, 8 & 9, 279–303, 8 figs. [30 refs.] English summary.

Two earlier cases of mycetoma with black grains were reported in Venezuela, one was caused by *Madurella grisea* and in the other the species of fungus was not identified. A few other cases of the disease have been identified but not published. In the present case, the patient, a half-breed Indian boy aged 10, was born and reared in a village called Nurucual in the State of Sucre, a dry region on the Carribean Sea coast of north-eastern Venezuela. He habitually wore hempen sandals and there was no history of trauma to account for the infection. The disease, of several months' duration, was manifested by a swelling 16 × 14 mm. in area on the sole of the left foot with an adjacent prominence the size of a lentil, and the discharge of small black grains in a sanious fluid from sinuses. The lesion made walking painful but did not cause marked disability. An exploratory incision was made and several dozen black grains were removed from a deep cavity. After this the wound healed and there was a considerable amelioration of the subjective symptoms. When a second examination was made, a month later, fewer grains were found, but the patient refused to submit to further examinations and was lost to sight.

The grains, which measured from 0·5 to 4 mm. in diameter, were irregular in shape, black and hard, gritty to the touch and showed a dull, rough surface. Sections and crushed preparations showed a mass of thick-walled, septate hyphae, measuring from 3·5 to 10 μ in diameter, embedded in a brownish-red vitreous matrix, consistent with the parasitic form of *Madurella mycetomi*. Cultures of the fungus were easily obtained, and they developed the characteristic colonies of *Madurella mycetomi* with diffusible pigment on "Sabouraud's" glucose (2%) peptone agar, which the authors call Sa medium. The nutrient property of this medium, for the fungus, was greatly enhanced by including in it 20% of fresh, sterilized, whole dairy milk. On this new modification, called Sablac medium, a richer and more rapid growth was obtained, and a more profuse production of aleuroconidia.

In slide cultures on either medium the mycelial growth consisted of a mixture of slender, septate hyphae, 2–4 μ in diameter, with more or less parallel sides, and toruloid or moniloid hyphae in which the segments were swollen, with polar constrictions, and varied greatly in diameter, the average being about 9 μ. There were also large, thin-walled, intercalary elements measuring 23–26 μ in diameter. At a later stage, particularly on the Sablac medium, tufts of slender, fertile aerial hyphae appeared in cultures incubated at 37°C. These hyphae branched and formed arborescences on which the aleuroconidia were borne as little

refringent, truncated piriform spores, measuring 4–6 μ in diameter, attached to the sides or the tip of the parent branch, sometimes on a little pedicle. These spores, which were not caducous, were sometimes entirely acrogenous and often occurred in terminal clusters of 2, 3 or 4 elements.

In general, the optimal temperature for vegetation was 37°C., and the strain hydrolysed starch but did not liquefy gelatin. Inoculation experiments on white rats gave entirely negative results.

[See also ABBOTT on conidia-formation by this fungus, this *Bulletin*, 1956, v. 53, 802.] *J. T. Duncan*

COCKSHOTT, W. P. **The Therapy of Mycetoma.** *West African Med. J.* 1957, Sept., v. 6 (n.s.), No. 3, 101–7. [27 refs.]

The author presents a clear and well-documented review of the chemotherapy of mycetoma, from which it is evident that iodides, various steroids, the aromatic diamidines, antibiotics and the sulphonamides have generally given disappointing results. Radiotherapy, ineffective *per se*, may be a useful ancillary to chemotherapy by causing a more active blood supply to the lesion.

The sulphone diaminodiphenylsulphone (DDS), which has proved valuable in the treatment of leprosy, has been shown by GONZALEZ OCHOA (*Therapy of Fungus Diseases*, 1955. London: J. & A. Churchill, Ltd.) to be effective in the treatment of nocardiosis caused by *Nocardia brasiliensis*, but the course of treatment must be prolonged well beyond apparent clinical cure. NEUHAUSER [this *Bulletin*, 1956, v. 53, 656] reported encouraging results from the treatment with DDS of a case of mycetoma caused by *Madurella grisea*.

In the absence of available data on the fungistatic effects of DDS against the fungi which cause mycetoma, the author conducted a series of tests of total and partial fungistasis, *in vitro*, against 6 strains of mycetoma fungi. The results showed that the concentrations of DDS necessary for total and for partial fungistasis were as follow: against *Phialophora jeanselmei* 2 μgm./ml. and 0·1 μgm./ml., respectively, *Monosporium apiospermum* 200 μgm./ml. and 20 μgm./ml., *Cephalosporium falciformis* 2,000 μgm./ml. and 2,000 μgm./ml., three different strains of *Madurella mycetomi* 20 μgm./ml. and 2 μgm./ml. The fungistatic effect of DDS is due to interference with the utilization of para-aminobenzoic acid (PABA) by the fungus, and it was shown that the addition of 0·01% PABA to 0·2% DDS annulled the fungistatic effect of the latter.

A new antifungal compound, Novex (22 "dihydroxy 55" dichloro diphenyl sulphide), which has proved useful in many superficial mycoses, was also tested *in vitro* against the same 6 fungi, with the following results: *P. jeanselmei*, total fungistasis 0·1 μgm./ml. and partial fungistasis 0·1 μgm./ml.; *M. apiospermum*, total not stated, partial 0·2 μgm./

ml.; *C. falciformis*, 60 μgm./ml. and 0·1 μgm./ml.; two strains of *M. mycetomi* 60 μgm./ml. and 1·0 μgm./ml.; one strain of *M. mycetomi*, 200 μgm./ml. and 1·0 μgm./ml. The addition of PABA did not affect the fungistatic action of Novex.

Although therapeutic evaluation cannot be based entirely on the results of *in vitro* tests, both DDS and Novex should be given an extended trial in mycetoma. It is recommended that, as a preliminary to surgical exploration of a mycetoma, a course of local injections of DDS and Novex with streptomycin should be given. The lesion should then be freely opened up and all grossly diseased tissue, including bone, removed, the loculi exposed and the sinuses curetted. The wound should then be liberally insufflated with Novex and left open to granulate. During healing, a soluble derivative of DDS should be used for local irrigation. After adequate healing, the administration of Novex and DDS by mouth should be continued for 1 or possibly 2 years. Chemotherapy alone is not sufficient but as an adjunct to conservative surgery it may fulfil the author's fervent hope. *J. T. Duncan*

ANDLEIGH, H. S. **Fungistatic Activity of Aromatic Diamidines.** *J. Indian Med. Ass.* 1957, Aug. 16, v. 29, No. 4, 146–7.

The author reports on the fungistatic power, *in vitro*, of 4 aromatic diamidines—stilbamidine, pentamidine, hydroxystilbamidine and M & B 938 (4:4′-diamidinodiphenylamine dihydrochloride)—against 5 strains of *Madurella mycetomi*.

The tests were made in brain heart infusion broth (Difco) containing penicillin 20 units and streptomycin 40 units per ml., by adding diminishing amounts of the drug to give a series of concentrations of 0·01, 0·05, 0·1 and 0·2 mgm. per ml., respectively. Each of the 5 strains of *M. mycetomi* was sown in the series of dilutions of each of the diamidines, and incubated at 37°C. [The form and amount of the inoculum and the time of incubation of the test are not stated, and, apparently, control cultures were not made.]

From the results of these tests, M & B 938 appeared to be the most effective, causing total fungistasis in all 5 strains at 0·05 mgm. per ml. Hydroxystilbamidine was almost as effective, and next in order was pentamidine, which caused total fungistasis at 0·1 mgm. per ml., but stilbamidine was not fully fungistatic even at 0·2 mgm. per ml.

[See also this *Bulletin*, 1957, v. 54, 1241.] *J. T. Duncan*

CONVERSE, J. L. **Effect of Surface Active Agents on Endosporulation of *Coccidioides immitis* in a Chemically Defined Medium.** *J. Bacteriology.* 1957, July, v. 74, No. 1, 106–7, 1 fig.

In a previous report Converse [this *Bulletin*, 1956, v. 53, 928] described a method of obtaining the spherule or sporangial form of *Coccidioides immitis* in culture from sowings of the saprophytic arthrospores in a

liquid synthetic medium. Although the stages of development up to the mature sporangium were clearly demonstrable, mycelium was always present, and the culture eventually reverted to the simple mycelial form.

In the present study the author's object was to obtain a pure spherule phase culture in which free dispersal of endospores took place from the mature sporangium, and the reproductive cycle, as seen in parasitic life, was completed and repeated. In this connexion, tests were made by adding, to the original medium, certain anionic, cationic and non-ionic surface active agents to determine their respective values as stimulants of endosporulation and aids to the dispersal of the endospores. The tests showed that Tamol N, an anionic surface active agent (sodium salt of a condensed aryl sulphonic acid), was, in these respects, the most effective. The strain of *C. immitis* used was that used in the previous study (strain M 11), and the cultures were incubated at 34°C. with constant shaking for 72 hours. Tamol N was a growth stimulant in concentrations from 0·05–1·00%, a stimulant of spherule production (98% spherules) from 0·005–1·00%, and a dispersing agent from 0·01–1·00%. Traces of mycelium could be removed by straining through 6 layers of surgical gauze, and a uniparticulate suspension obtained with 1–7 × 10^7 endospores per ml. This spherule form was maintained through 3 serial transfers at 72-hour intervals, with Tamol N at 0·05–1·00%. *J. T. Duncan*

LACAZ, C. da S. & BOLOGNANI, H., Jr. Conservação de culturas do *Paracoccidioides brasiliensis* em ágar-Sabouraud, protegidas com vaselina líquida. [**Preservation of Cultures of** *Paracoccidioides brasiliensis* **on Sabouraud's Medium Protected with Liquid Petrolatum**] *Hospital*. Rio de Janeiro. 1956. Mar., v. 49, No. 3, 363–6.

The English summary appended to the paper is as follows:—

"Twenty strains of filamentous and cerebriform types of *Paracoccidioides brasiliensis* were cultured on Sabouraud' glucose agar at room temperature for 10 to 12 months protected with liquid petrolatum in order to study their viabilities. Following this period of time, 3 cultures were entirely dry, 3 did not give sub-cultures and 14 showed normal development. On the other hand the cultures protected by petrolatum did not show any alteration in their characteristic macroscopic features. According to these results and other observations this method of fungus culture preservation should be better studied and used, because it presents benefits which are analysed."

LACAZ, C. da S., SAMPAIO, S. A. P. & DEL NEGRO, G. Altividade de duas diamidinas aromáticas na blastomicose Sul-Americana. [**Effect of Two Aromatic Diamidines on South American Blastomycosis**] *Hospital*. Rio de Janeiro. 1955, Aug., v. 48, No. 2, 163–9. [18 refs.]

The English summary appended to the paper is as follows:—

"The effects of Stilbamidine and Hydroxystilbamidine 'in vitro' and 'in vivo' on *Paracoccidioides brasiliensis* are studied. Hydroxystilbamidine showed little more activity than Stilbamidine, 'in vitro'. The substances were administered for two patients with South American blastomycosis to test the effectiveness. One of the patients who had extensive blastomycosis lesions died after the 6th injection of Hydroxystilbamidine. The second one, who received 19 injections of Hydroxystilbamidine and 8 of Stilbamidine did not show any clinical improvement. These preliminary results and the report of Perry *et al.* (1954) recently published, suggest a negative effect of both diamidine derivatives in South-American blastomycosis. This fact could be one more difference between South and North American blastomycosis."

TROPICAL OPHTHALMOLOGY

RODGER, F. C. **Some Observations on the Punctate Keratides in Africa.** *Brit. J. Ophthalm.* 1957, Oct., v. 41, No. 10, 599–612, 4 figs. [23 refs.]

This is another in the series of separate papers published by the Director of the recent West African Ophthalmic Survey. It also suffers to a certain extent by being separated from other publications by the same author, and readers will look forward to the production of the complete report of the Survey by the British Empire Society for the Blind.

In this paper, the author's conclusions are as follows:—

"(1) The different types of punctate keratides found in the tropics are described, and the differences are stressed.

"(2) The punctate keratides due to the herpes and epidemic-type viruses and those seen in onchocerciasis are shown to be somewhat similar. In a group of 750 African subjects, twenty-two, eleven and eighteen cases of each disease respectively are described in detail. They were observed over periods of from 15 to 18 months.

"(3) The aetiology of isolated punctate corneal opacities in a quiet eye is discussed, and it is concluded that they are seldom due to onchocerciasis, even when the conjunctival biopsies are positive. In six cases, three will be due to the herpes virus, two to the epidemic type, and one to onchocerciasis.

"(4) The histopathology of two cases is given, along with photomicrographs of the lesions."

[It is doubtful if these conclusions will be accepted without reservation by all other authorities.] *D. P. Choyce*

See also p. 65. ASHTON, **Degeneration of the Retina due to 1:5-Di (*P*-Aminophenoxy) Pentane Dihydrochloride.**

T'ANG, Fei-Fan, CHANG, Hsiao-Lou, HUANG, Yuan-T'ung & WANG, K'o-Ch'ien. **Studies on the Etiology of Trachoma with special reference to Isolation of the Virus in Chick Embryo.** *Chinese Med. J.* Peking. 1957, June, v. 75, No. 6, 429–47, 4 figs. on pl. [35 refs.]

Fertile eggs at the 6th–8th day of incubation were inoculated in the yolk sac with material from the conjunctival sac of patients suffering from trachoma; incubation was continued for 10–14 days at 35°C., and up to 5 blind passages were made with embryo suspensions. Examination of stained smears of the yolk sacs showed the presence of a virus in 3 of 68 experiments carried out with 93 specimens of infected material. In most instances the isolation attempts failed through bacterial contamination, but this could be suppressed by the use of penicillin and streptomycin. In smears stained with Giemsa elementary bodies were seen sometimes arranged in pairs or short chains; from filtration experiments their diameter was estimated at 130–200 mμ. The virus was inactivated by heating at 50°C. for 30 minutes and by storage in glycerol for 14 days, but survived for 190 days after freeze-drying. Follicles appeared after 7–16 days in 7 monkeys inoculated with virus on the conjunctiva. The virus was not pathogenic for mice, rabbits, guineapigs, pigeons or hens. *D. J. Bauer*

BIETTI, G. B. Etat actuel de la chimiothérapie et de l'antibiothérapie du trachome. [**Present Status of the Chemotherapy and Antibiotic Therapy of Trachoma**] *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 5, 975–94. [46 refs.]

See also p. 114. PAMPIGLIONE, Le miasi oculari dell'uomo in Italia: revisione critica dei casi descritti. [**Critical Revision of Cases of Ocular Myiasis seen in Man in Italy**]

HEAT STROKE AND ALLIED CONDITIONS

LIND, A. R. & HELLON, R. F. **Assessment of Physiological Severity of Hot Climates.** *J. Applied Physiol.* 1957, July, v. 11, No. 1, 35–40, 3 figs. [18 refs.]

In order to assess the value of Effective Temperature (ET) as a scale of stress 10 volunteers, previously artificially acclimatized to heat, were

exposed in a "hot room" at high humidity (85% RH) with dry bulb temperature (DB) 37, 38, 40 and 39°C. and at 45% RH to DB 44·7, 46·1, 48·9 and 50·3°C. The first 3 members of high and low humidity series had equal ET.

The criteria of physiological effect were abdominal discomfort, nausea, vertigo, local pallor or flushing and circulatory collapse in conjunction with raised rectal temperature and pulse rate.

It was concluded that the ET scales were inadequate to assess physiological stress in the above range of climates and that the more severe the climate becomes, the less accurate is the scale. This work supports previous investigators who found that ET scales exaggerate the stress imposed by high DB.

The predicted 4-hour sweat rate scale accurately assessed the order of severity of the 8 environments. *M. L. Thomson*

Medical J. Malaya, 1957, Mar., v. 11, No. 3, 163–89, 5 figs. [35 refs.]

Symposium on Health and Efficiency in an Equatorial Climate.

E. M. Glaser presented a paper on *The Influence of Physiological Research on the Achievement of Comfort and Efficiency in an Equatorial Climate* (pp. 166–170). In the past the uncritical acceptance of wrong ideas by residents in the tropics has militated against adaptation to life in hot countries. For example, sun helmets, pugarees, and spine pads were worn to protect brain and spinal cord against penetrating rays of the sun, and abdominal bandages to protect against chilling of the abdomen, thought to be the cause of tropical diarrhoeas. Physiologists have helped to dispel these fallacies and are assisting in the development of suitable houses and clothing for the tropics.

Because of the exceedingly uniform climate of Malaya, long-term residents appear to have lost the ability to adapt to changes of temperature. They find 90°F. with about 70% humidity uncomfortably hot; less than 80°F. results in their donning woollen cardigans. This uniformity is not favourable to coping with extremes of heat or cold. The remedy is to take energetic exercise at times and, if this is done, air conditioning is not necessary for comfort in Malaya, at least in the young.

It has been shown that part of acclimatization to heat and cold is that one ceases to mind being too hot or too cold. There may also be a general slowing down of activities in the heat.

Small people are at an advantage over large, and thin persons over fat, partly because surface area is greater compared to mass, but also because subcutaneous fat is a good insulator. Although men over 40 can apparently transfer blood more rapidly than the young between deep tissues and the extremities of the body as required for temperature regulation, young men can sweat more readily and are therefore better off, on balance, where evaporative heat loss is required.

I. A. Simpson (*The Influence of Climate on Diets*, pp. 171–176)

described the effect of the environment on available foodstuffs, a fact of fundamental importance in the health and efficiency of man. For example, passing from the N.W. Punjab to the Ganges plains there is a fall in physique, stamina and efficiency of the inhabitants, and also a gradual deterioration of the diet. One of the main defects in the diet of the hot moist plains is absence of milk. Malnutrition leads to a vicious cycle: malnutrition, apathy, inertia, malnutrition. An experiment conducted on a Federation Estate shows that this cycle can be broken. A nutritious meal was given for 8 months, twice daily, to all labourers, Chinese, Malays and Indians, on the Estate. Medical examination before, during and after the experiment showed that this resulted in enormous improvement in health and work capacity.

C. G. Webb (*The Role of Atmospheric Water Vapour, with reference to Thermal Balance in Low Latitudes*, pp. 177–184) gives a competent survey of the role of atmospheric water vapour in hot climates, with particular reference to Singapore, which should be consulted in the original.

G. T. Ward (*The Modification of the Tropical Environment for Comfort and Efficiency—Engineering Aspects*, pp. 185–189) describes the design data required for efficient, economical air conditioning in Malaya. These fall under (i) the inside environment, (ii) the outside environment, and (iii) the design of buildings.

(i) It is easy to cater for requirements for, say, preservation of electrical equipment or film processing but more difficult to provide human comfort. North American standards of 71°F. optimum, and 76°F. maximum effective temperatures have been used, but these are too rigorous for Malaya where most of the population have been brought up in the tropics; it is probable that 74°F. and 78°F. are nearer to the correct values.

(ii) Hourly diurnal and seasonal variations in outside temperature, humidity and air movement are necessary data on which to calculate the capacity required in any air-conditioning plant. The dry bulb inside should not be more than 10°F. lower than outside, so as to avoid shock and interference with adaptation to the natural climate.

(iii) Air-conditioning an existing building, which may be highly unsuitable, requires knowledge of materials of construction, extent and location of doors and windows, and number of occupants, lights, motors and other sources of heat.

It should be noted that the thermal capacity of walls may be almost as important as their conductivity; increased thermal capacity usually means a saving in air conditioning.

The ideal environment should have the correct effective temperature and should be free from unpleasant odours. The cost of reducing effective temperature by altering one variable increases in the order: radiation, air movement, dehumidification, air cooling. *M. L. Thomson*

MISCELLANEOUS DISEASES

South African Med. J. 1957, Aug. 24, v. 31, No. 34, 854–7. **Some African Cardiopathies. Report of a Joint Seminar of the Departments of Pathology and Medicine of the University of the Witwatersrand** [McGregor, M.; Davies, J. N. P.; Higginson, J.; Becker, B. J. P.].

This Seminar met under the chairmanship of Dr. M. McGregor to discuss the similarities and differences between three new forms of heart disease that have been described in Africa in the last decade. It was of particular importance because each of the three main participants had been responsible for the pathological description of one of these cardiopathies, and the discussion took place after they had viewed each other's material. Moreover, the conditions discussed are not merely cardiological collectors' pieces; each one accounts for 10 to 15% of heart-failure deaths in its own region.

Endomyocardial fibrosis (EMF) in Uganda was described by Prof. J. N. P. Davies; from Johannesburg nutritional heart disease was described by Dr. J. Higginson, and cardiovascular collagenosis with parietal endocardial thrombosis by Prof. B. J. P. Becker. The report is a succinct statement of the views of these authorities, and cannot be further condensed; indeed the reader will wish to consult the original papers, the key ones being: Ball *et al.*, *Lancet*, 1954, May 22, 1049 [this *Bulletin*, 1954, v. 51, 839]; Higginson *et al.*, *Brit. Heart J.*, 1952, v. 14, 213; Becker *et al.*, *Circulation*, 1953, v. 7, 345.

Very briefly, however, EMF is characterized by a dense endocardial layer of fibrous tissue occupying the inflow tracts of the ventricles, often limited by a sharp edge, sometimes involving the posterior mitral cusp but never the aortic or pulmonary valves; there is sometimes adherent clot, but systemic emboli do not occur. Nutritional heart disease presents as low-output cardiac failure, with a large dilated heart that may or may not show mural thrombi, without valvular involvement; improvement and relapse could be related to the state of nutrition in some cases. In cardiovascular collagenosis there is rapidly progressive congestive heart failure; autopsy reveals visceral infarction in over three-quarters of the cases, and a dilated heart with mural thrombi overlying areas of subendocardial necrosis, especially in the left ventricle. Early cases show an acute mucoid oedema of the endocardium. The condition does not appear to be due to malnutrition, toxoplasmosis or a hypersensitivity reaction.

Dr. McGregor, in an able summary, found that the Seminar established that EMF was a separate entity, that the two cardiopathies seen in Johannesburg were probably identical, and that none of the conditions resembled congenital fibro-elastosis, or the cardiopathies of Loeffler or Fiedler.

Alan B. Raper

GELFAND, M. **Symmetrical Gangrene occurring in a Female African affected with Endomyocardial Fibrosis.** *Central African J. of Med.* 1957, Sept., v. 3, No. 9, 374–6.

EDINGTON, G. M. & DODU, S. R. A. **The Diagnosis of Haemosiderosis by Sternal Marrow Puncture.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 429–32, 4 figs. on 2 pls. [12 refs.]

Edington in 1952 reported from the Gold Coast [Ghana] (*Malnutrition in African Mothers, Infants and young Children*, p. 115, 1954. London: H.M. Stationery Office) that large amounts of haemosiderin are found in the viscera of Africans, a finding which is paralleled by well-known reports in the South African Bantu. The present paper attempts to correlate in 61 selected autopsies the iron content of the liver with that of the bone-marrow; in order to establish whether or not in the living patient an examination of the marrow for the presence of histochemically demonstrable iron might be a satisfactory method of diagnosing haemosiderosis.

Livers were classified from histochemical appearances in 5 groups according to GILLMAN and GILLMAN [*Perspectives in Human Malnutrition*, this *Bulletin*, 1952, v. 49, 1166]. They ranged from those with no iron pigment to those with large amounts in the portal tracts, parenchymal cells and Kupffer cells with and without cirrhosis. The amount of iron in the bone-marrow was also assessed from histochemical appearance, ranging from nil to marked excess. It was found that when there was an excess of iron in the marrow, there was always histochemically demonstrable iron in the liver. In 7 instances iron was present in excess in the marrow but only in the Kupffer cells of the liver. It would thus seem that the bone-marrow, if anything, is more sensitive for the demonstration of iron deposits.

To test the correlation between bone-marrow and liver findings, 44 patients suffering from uncomplicated diabetes mellitus were examined. No less than 7 of these showed iron in the bone-marrow, which suggests that the incidence of haemosiderosis in diabetes mellitus must be high in Ghana. Of the 7, 6 were examined successfully by liver biopsy. All samples showed iron deposits and 4 of them belonged to the most severe group of haemosiderosis of the liver. *H. Lehmann*

GUPTA, I. M. & RAO, M. S. N. **Eosinophilic Nodule of the Breast in a Case of Tropical Eosinophilia. Case Report.** *Indian J. Med. Sci.* 1957, Sept., v. 11, No. 9, 728–32, 3 figs. on pl.

"1. A case of eosinophilic nodule in the breast is described in a female patient suffering from tropical eosinophilia. Histologically, the lesion

was characterised by a massive infiltration of the interacinar breast tissue with eosinophils.

"2. It is contended that the lesion is an unusual local manifestation of tropical eosinophilia."

PIETERS, G. Cancers d'enfants au Congo belge. [**Cancer in Children in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1957, June 30, v. 37, No. 3, 371–7, 5 figs. on pl. [12 refs.]

The English summary appended to the paper is as follows:—

"The author reports two cases of embryogenic malignant tumors in black children in Belgian Congo. He discusses the problem of malignancy in infancy among unsophisticated peoples."

CARCASSI, U. & PITZUS, F. Distribuzione geografica del favismo in Sardegna, raffronti con la talassemia e la malaria. [**Geographical Distribution of Favism in Sardinia. Comparison with Thalassaemia and Malaria**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, July, v. 38, No. 7, 357–70, 2 figs. [24 refs.] English summary (5 lines).

Favism is an icterohaemoglobinuric syndrome stated to be due to the consumption of the bean *Vicia fava* or the inhalation of the pollen, and the author describes an epidemiological survey in Sardinia to ascertain its incidence.

He first points out that it is not peculiar to the island as Sicily is also an important focus, and that it really must be regarded as a disease of the whole Mediterranean basin. Those cases reported from the New World, with only 1 exception, were in descendants of persons from the Mediterranean region. Thus a specific racial tendency is probably present.

The survey was carried out in 1953 mainly by means of a questionary. and the disease was reported in 212 of the 260 communes on the island. Of the 3 provinces, that of Cagliari in the south had the greatest incidence. In all, 624 cases were reported, but as 905 patients attended at the clinic in the 4 years 1950–53, the official figures are not considered to represent the true incidence. All ages and both sexes are affected but the majority are 1–15 years of age. The first attack is the most serious. The disease has a definite spring seasonal incidence related to the flowering on the bean; it occurs in epidemic waves depending on the meteorological conditions, the measures taken by the patients to avoid another attack, and the extent of cultivation. Both grave and mild forms occur, the former after consumption of the fresh bean either raw or cooked, while dried beans seem to be less active (though the only fatal case reported was due to eating dried beans in the winter). An interesting

case is mentioned of a 6-months-old breast-fed baby having an attack after his mother had eaten fresh cooked beans for some days, without showing any symptoms. No zone is immune and there seems to be a geographical association between the incidence of this disease, malaria and thalassaemia. No preventive measures are suggested.

W. K. Dunscombe

SARPIO, O. **Observations on Skeletal Changes in Experimental Lathyrism in the Rat.** *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1957, v. 35, No. 3, 281–9, 6 figs. [11 refs.]

"Diets containing 50 per cent Lathyrus odoratus seeds fed to rats at the age of one month produced wide subperiosteal new-bone formations in the long bones, especially at the sites of tendinous insertions. Severe kyphoscoliotic deformities of the spine resulted from the weakening and collapse of several vertebrae. It is surmised that scoliosis produced in experimental animals is due to the loosening of the insertions of the intervertebral ligaments of the vertebrae."

[See also this *Bulletin*, 1953, v. 50, 342.]

PARASITOLOGY: GENERAL

ZEMBRZUSKI, K. Wyniki masowych badań parazytofauny przewodu pokarmowego człowieka w Polsce w roku 1954. [**Results of Mass Investigations into the Parasitic Fauna of the Alimentary Tract of Man in Poland in 1954**] *Wiadomości Parazytologiczne.* Warsaw. 1957, v. 3, No. 5, 473–5.

The English summary appended to the paper is as follows:—

"This is a comparison of coprological investigations carried out by the sanitary-epidemiological stations in Warsaw and 11 provinces of Poland, in 1954. 30076 persons were examined, chiefly children and young people (exceptionally adults) by means of Fülleborn's and Hall's methods and of direct smear. There were notified: *Enterobius vermicularis*—20 per cent, *Trichuris trichiura*—11·6 per cent, *Ascaris lumbricoides*—5·2 per cent, *Lamblia* [*Giardia*] *intestinalis*—5·1 per cent, tapeworms (*Taenia solium*, *T. saginata*, *Hymenolepis nana*)—0·2 per cent. The greatest percentage of nematodes fell in the provinces: Cracow, Kielce, Poznań and Rzeszów. The greatest quantities of tapeworms were found in the Bydgoszcz province, and of *L. intestinalis* in the Gdańsk province. The

differences between country and city were not considerable with exception of *Trichuris trichiura* (country—24·4 per cent, city—9·1 per cent) and *Enterobius vermicularis* (country 40·6 per cent, city 16 per cent).''

GONZALES-MUGABURU, L. Encuesta de parásitos intestinales en 615 escolares del Rímac. [**Survey of Intestinal Parasites in 615 Schoolchildren in Rimac, Peru**] *Rev. Med. Exper.* Lima. 1956, Dec., v. 10, No. 2, 147–52.

The English summary appended to the paper is as follows:—

''The microscopical examination of one stool in each of 615 schoolchildren of the Rimac district has shown:

''1. The high percentage of intestinal protozoa (79·8%) found suggests great fecal contamination.

''2. The great frequency of *H. nana* 166 (27·0%) presents a problem that should be given consideration.

''3. The finding of *Strongyloides stercoralis* and *Ancylostoma* or *Necator* only in individuals that had spent some time in the Peruvian jungle, suggests once more that these parasites are not transmitted in this part of the Peruvian coast.

''4. The presence of three cases of *Isospora belli* indicates that this coccidia is much more frequent than it was supposed.''

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

MATTINGLY, P. F. & KNIGHT, K. L. **The Mosquitoes of Arabia. I.** *Bull. Brit. Mus.* (*Nat. Hist.*) Entom. Ser. 1956, v. 4, No. 3, 91–141, 4 figs. [Numerous refs.]

This paper brings together a considerable body of information, much of it comparatively recent, about mosquitoes of the Arabian peninsula, adjacent islands including Socotra, and Sinai, Irak and Transjordan. Facts are few for north and central Arabia, Kuwait and Qatar. Species, subspecies and varieties of mosquito amount to 46, and *Anopheles demeilloni*, *Aëdes caballus* and *Culex arbiceni*, *C. duttoni* and *C. pipiens* var. *molestus* are recorded for the first time. Keys are given for adult females and 4th-stage larvae, amplified with taxonomic notes and full details of distribution records in collections in different institutions.

Zoogeographically the area is mainly Palaearctic with oriental intrusions along the Persian Gulf shore and Ethiopian species occurring at the south-western corner. *D. S. Bertram*

STEYN, J. J., ROSE INNES, R. & HECHTER SCHULZ, K. **A Culicine Mosquito Survey of the Upper Limpopo River Valley.** *J. Entom. Soc. South Africa.* 1955, v. 18, No. 2, 238–46, 1 map. [Summary taken from *Rev. Applied Entom.* Ser. B. 1957, Oct., v. 45, Pt. 10, 162.]

"In a mosquito survey of the Tranvsaal side of the upper Limpopo valley, made in March 1953, 408 larvae of 18 species and 130 adults of 14 species were taken. In all, six species of *Anopheles*, nine of *Aëdes* and six of *Culex* were represented. The species of *Aëdes* included three, *A. aegypti* (L.), *A. metallicus* (Edw.) and *A. vittatus* (Big.), that are known or believed to be vectors of yellow fever in other parts of Africa. Only the last was at all numerous, being represented by five larvae and 48 adults. The only other species of which more than 50 examples were taken were *A. fulgens* (Edw.) (231) and *Culex nebulosus* var. *pseudocinereus* Theo. (98). *Anopheles gambiae* Giles was represented by 23 larvae and three adults. The species taken in each locality searched are shown in a table with the habitats in which they were found, and an analysis of their breeding and resting places is made."

VINCKE, I. H., HOLSTEIN, M. H. & RIVOLA, E. Note sur *Anopheles demeilloni* Evans et *Anopheles marshalli* var. *pitchfordi* Giles au Congo belge. [**Note on** *Anopheles demeilloni* **and** *A. marshalli pitchfordi* **in the Belgian Congo**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 391–7, 2 figs.

HARA, J. **Studies on the Female Terminalia of Japanese Mosquitoes.** *Japanese J. Exper. Med.* 1957, Apr., v. 27, Nos. 1/2, 45–91, 48 pls.

CERVONE, L. Sulla struttura perimicropilare delle'uovo in *Culex autogenicus* dell'Agro Pontino. [**On the Perimicropile Structure of the Egg in** *Culex autogenicus* **from the Pontine Region of Italy (Agro Pontino)**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1957, v. 20, Pts. 7/8, 695–701, 4 figs. on 2 pls. English summary.

GILLETT, J. D. **Age Analysis in the Biting-Cycle of the Mosquito** *Taeniorhynchus* (*Mansonioides*) *africanus* **Theobald, based on the Presence of Parasitic Mites.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 151–8, 3 figs. [24 refs.]

Observations are described which show an association between the age of *Taeniorhynchus africanus* and their infestation with mites, and the biting cycle is analysed on that basis.

The criterion for age included the condition of the scales of the abdomen and legs as well as that of the wings.

Of mosquitoes judged to be young and those judged to be old the proportions harbouring mites were 49% and 3% respectively. The proportion may be different at other times and places and it is possible that the more heavily infested mosquitoes do not live to become old.

Mites on young mosquitoes were often numerous, as many as 35 being taken on one mosquito, whereas on old mosquitoes the number of mites was usually 1 or 2. It would seem justifiable to regard all mite-infested mosquitoes as young.

Observations made during three 24-hour catches showed a gradual increase of biting activity during the night reaching a peak between 2 a.m. and 5 a.m. It was also observed that the biting activity of mite-infested and uninfested females followed the same pattern and reached a peak at the same time. *H. S. Leeson*

RAGEAU, J. & HAMON, J. *Aedes* (Diptera, Culicidae) appartenant au sous-genre *Mucidus* en Nouvelle-Calédonie. [**Aëdes of the Subgenus** *Mucidus* **in New Caledonia**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 372–8, 2 figs. [16 refs.]

DAVIS, A. N. & GAHAN, J. B. **Field Tests with Four Phosphorus Insecticides against Salt-Marsh Mosquitoes in Florida.** *Mosquito News.* 1957, Sept., v. 17, No. 3, 180–83.

"Field tests were conducted with aerial applications of four organic-phosphorus compounds against resistant salt-marsh mosquitoes, *Aedes taeniorhynchus* (Wied.) and *A. sollicitans* (Wlkr.).

"Against adults, oil sprays of malathion and Chlorthion gave more than 90 percent control at 0·1 pound per acre in grove or marsh areas, and less than 60 percent control at 0·25 pound in mangrove marshes. A water solution of Dipterex gave 77 to 96 percent control at 0·5 pound per acre in groves, but was less effective at lower concentrations. In tests against larvae, oil solutions of Bayer 21/199, Chlorthion, malathion, and Dipterex gave more than 90 percent control at 0·25 pound per acre. As granular larvicides Bayer 21/199 gave 97 to 99 percent control at 0·1 pound per acre; at 0·5 pound per acre Chlorthion gave 97 to 100 percent control, malathion 64 to 99 percent, and Dipterex 0 to 79 percent."

HADDOW, A. J. & GILLETT, J. D. **Observations on the Oviposition-Cycle of *Aëdes* (*Stegomyia*) *aegypti* (Linnaeus).** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 159–69, 4 figs. [27 refs.]

A summary is given of what is already known of cyclical activity in *Aëdes aegypti*. A detailed description then follows of 4 experiments designed to elucidate the problem of the oviposition cycle.

The first experiment was carried out in conditions of normally fluctuating daylight; the second in conditions of constant light; the third of day and night artificially reversed, while the fourth repeated the first and second but with mosquitoes of known age and fed on blood at known times.

The experiments indicated that while light played an important part in oviposition, maximum oviposition occurred some time after light appeared. In constant light the normal periodicity of egg-laying broke down, but cyclical oviposition could be imposed by alternating artificial light and darkness.

To whatever extent the light periods were reduced or extended the maximum oviposition always occurred in the 3rd four-hour period after the onset of light. When the light period was reduced to 8 hours the oviposition peak occurred after dark in the first four-hour dark period.

The most probable explanation is that a light-activated hormone is responsible but it acts only when the ovary has reached a certain degree of maturity. *H. S. Leeson*

GILLETT, J. D. & HADDOW, A. J. **Laboratory Observations on the Oviposition-Cycle in the Mosquito *Aëdes* (*Stegomyia*) *africanus* Theobald.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 170–74, 2 figs. [13 refs.]

"Laboratory observations on the oviposition-cycle in *Aëdes africanus* show that, under conditions of normally fluctuating 12-hour equatorial day and night, oviposition occurs towards the end of the daylight period. This behaviour is very similar to that found in *A. aegypti*, in which it has been shown that, in determining the time of oviposition, light, the main controlling factor, overrides such factors as time of the blood-meal and temperature."

PARKER, A. H. **The Susceptibility of *Aëdes aegypti* Larvae of Different Ages to DDT and Dieldrin, and the Relevance of the Results to the Formulation of Standardized Susceptibility Tests for Mosquito Larvae.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 201–15. [11 refs.]

With the rearing method used, the *Aëdes aegypti* larvae were in the following instars on the following days: stage I, first and second days;

stage II, third day; stage III, fourth and fifth days; stage IV, fifth, sixth, seventh and eighth days.

The larvicide method was a utilization of the photonegative response of the larvae after the manner described by BURCHFIELD and HARTZELL [this *Bulletin*, 1955, v. 52, 938]. The larvae were exposed for one hour in the insecticide solution and mortality counts were made 24 hours later. A series of concentrations were used and the LD50s were obtained from log dosage/probit regression lines. In a second series of tests, fourth- to eighth-day larvae were exposed to the insecticide solutions for 24 hours.

With one-hour exposures, a comparison of the susceptibility of each individual age-group to DDT and dieldrin showed that at all stages from the first to the fifth day (stage III) the LD50 of dieldrin was significantly higher than that of DDT. With fifth-day stage IV, there was no significant difference in LD50s, but from the sixth day onwards the LD50s of DDT were significantly higher than those of dieldrin, the difference becoming wider as the age of the larvae rose.

With the 24-hour exposures, however, it was shown that from the fourth to the sixth day the LD50s of dieldrin were higher than those of DDT. There was no difference on the seventh and eighth days, indicating that there was no significant reversal in apparent toxicity, such as occurred with one-hour exposures.

Concerning the formulation of standardized susceptibility tests for mosquito larvae it is suggested, from the present work with *Aëdes aegypti*, that the following points be noted: (i) that for 24-hour exposure no recovery period is necessary. Moreover, slight errors in the length of the exposure time are less important than for shorter exposures, *e.g.*, 1 hour; (ii) that if distilled water is used for making the insecticide solution, instead of tap water which may contain traces of organic matter known to affect the toxicity of DDT suspensions and emulsions [*ibid.*, 1947, v. 44, 645] third or fourth stage larvae must be used. Since, however, the fourth stage is rather variable in susceptibility, the exclusive use of larvae in the comparatively homogeneous third instar would be preferable. *W. Z. Coker*

HADAWAY, A. B. & BARLOW, F. **The Influence of Temperature and Humidity upon the Action of Insecticides. I.—During the Post-Treatment Period.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 187–93. [15 refs.]

It has been observed in recent field trials in mosquito control, that the insecticidal effectiveness of deposits in treated houses may vary from season to season [this *Bulletin*, 1956, v. 53, 976]. Since atmospheric conditions may affect both the insect and the insecticide in various ways, the relationship between environmental conditions and insecticidal activity is complex. The experiments in this series were designed to gain a better understanding of the causes of the variations in mosquito

control obtained in the field. Various aspects of the influence of temperature and humidity upon the action of insecticides on mosquitoes (*Aëdes aegypti* and *Anopheles stephensi*) and house-flies (*Musca domestica*) were studied under controlled conditions in the laboratory. Tests were made on young adult females.

The insects were kept at different temperatures or different humidities after treatment with kerosene solutions of DDT, gamma BHC, dieldrin or Diazinon, and after contact with dry deposits of DDT, gamma BHC or dieldrin wettable powders.

It was shown that the toxicity of DDT to mosquitoes and house-flies decreased substantially as the post-treatment temperature increased from 20° to 30°C., whereas the toxicity of dieldrin and Diazinon increased as the post-treatment temperature increased. Temperature had no significant effect on the action of gamma BHC, although there was a tendency for kills of house-flies to be higher at higher temperatures. Differences in atmospheric humidity after treatment had no significant effect on the action of any of the insecticides. *W. Z. Coker*

HADAWAY, A. B. & BARLOW, F. **The Influence of Temperature and Humidity upon the Action of Insecticides. II.—Temperature during the Pre-Treatment Period.** *Ann. Trop. Med. & Parasit.* 1957, June, v. 51, No. 2, 194–200. [10 refs.]

In this experiment the effect of temperature, during the pre-treatment period, on the insecticidal activity of DDT, dieldrin and gamma BHC on female *Aëdes aegypti* and on *Musca domestica* was studied.

The insects were reared at 25° and 30°C., and the experiment was designed in such a way that it was possible to make direct comparisons between insects in a similar physiological condition rather than of the same age.

It was found that the LD50s of the insecticides for insects held before and after treatment at 30°C. were, according to the insecticides used, greater or less than those for comparable insects reared and held before and after treatment at 25°C. These differences were assigned to the effect of the post-treatment temperature on the insecticidal activity. The pre-treatment temperature has, therefore, no significant effect on the susceptibility of the insects. *W. Z. Coker*

SACCÀ, G. Ricerche sulla speciazione nelle mosche domestiche. IV. Esperienze sull'isolamento sessuale fra le subspecie di *Musca domestica* L. [**Researches on the Speciation in the House-Fly. IV. Experiences on Sexual Isolation between the Subspecies of** *Musca domestica* **L.**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1957, v. 20, Pts. 7/8, 702–12. 6 figs. on 3 pls. [11 refs.] English summary.

GAUD, J., DUPUY, R., & N'HAILI, A. Mouches capturées dans l'agglomération urbaine de Rabat-Salé. [**Flies Captured in the Urban Area of Rabat, Morocco**] *Bull. Inst. Hyg. Maroc.* 1955, v. 15, Nos. 3/4. 209–19, 1 fig.

In Rabat, Morocco, during the years 1955–56 flies were trapped in the Bruton fly-trap [in this paper mistakenly called the "Burton" trap]. A description and illustration of the trap are given [see also this *Bulletin*. 1956, v. 53, 1284, and *Bull. Hyg.*, 1945, v. 20, 748]. The data are set out in 5 tables. 11 species of flies are listed and the families and subfamilies of others are given though not identified as to species.

Throughout the period over 36,000 flies were caught and examined; more than 25,000 were *Musca domestica vicina*. *Musca sorbens* was the next most numerous but formed only one-eighth of the total.

Baits used were flesh, fruit, vegetables and excrement. Most flies were attracted to flesh which was waste products from the abattoir.

This method of conducting a fly survey by using the Bruton trap has certain obvious advantages over the "grill" method, especially in regard to identification of species and the fluctuations in numbers due to season and other local conditions. *H. S. Leeson*

MACLEOD, J. & DONNELLY, J. **Individual and Group Marking Methods for Fly-Population Studies.** *Bull. Entom. Res.* 1957, Sept., v. 48. Pt. 3, 585–92.

Individual and mass marking methods for adults of *Calliphora*, *Lucilia* and *Phormia* have been tried on a field scale in the north of England. Various colours of nitro-cellulose paints were used for marking individual flies by hand; the mark can be placed in 10 positions. Incapacitation and mortality are often high. Mass marking with radio-active ^{32}P was done by feeding adult flies on dosed water or sugar solution. The scatter of count level was too great for differentiation of flies fed on solutions of different amounts of radioactivity, but there are indications that this should be possible if dosage is in the larval stage. Concentrations of 0·013 to 0·035 millicuries/ml. in 5% sucrose solution gave no harmful effects when available to the flies for up to 72 hours.

It is considered that, allowing for loss by excretion, tagged flies could be confidently identified for 4 to 7 weeks, depending on their initial count on release. Decay losses during pupation reduce the prospects of recognizing adults, marked as larvae, to about the first 3 weeks of imaginal life.

Particulars are given of several powdered dyes used for dusting flies, the presence of the dye being elicited by acetone as a solvent dropped on the dead flies individually on filter paper. The limit of persistence was about 2 weeks. Combinations of marking by coloured dusts and radioactive ^{32}P have their uses. Some encouraging results have been obtained in the marking of flies which stain themselves at emergence by pushing

through a layer of fluorescent powder. Details are given of all the methods discussed. *D. S. Bertram*

BARKER, R. J. **Some Effects of Temperature on Adult House Flies treated with DDT.** *J. Econom. Entom.* 1957, Aug., v. 50, No. 4, 446–50, 3 figs.

"Untreated house flies tolerate temperatures from 5° to 40°C., inclusive, without adverse effects. The effects of carbon dioxide anesthesia are prolonged and encouraged at lower temperatures.

"The effects of DDT are manifested earlier and the symptoms of poisoning are telescoped with higher temperature. From 5° to 30°, survival was higher at higher temperatures. Above 30° survival was slightly lower.

"Absorption of topically applied DDT was increased with higher temperature. Differences with respect to strain are not found in surviving flies. The DDT absorbed in surviving flies seemed closely correlated to the percentage of survivors.

"The degradation of DDT, as measured by the amount of DDE and non-Schechter-Haller metabolite, was also higher at higher temperatures. The amount of undegraded DDT within live insects was essentially constant for a given dosage regardless of temperature. The quantity of internal DDT seemed self-limiting; any flies, whose internal DDT exceeded a critical limit, were killed and thus were excluded from the analysis.

"By analyzing only survivors, a lethal mechanism can be discerned because it will remain constant as other factors vary. This search for a self-limiting constant is believed to be a unique approach to the detection of a lethal factor. It can reduce the confusion of cause and effect.

"No differences except in mortality were evident in survivors of the three strains studied. This suggests that tolerant flies in these strains do not differ, and that the strains differ only in the number of these tolerant flies present.

"The pooled data of the three strains are summarized in figs. 1, 2 and 3."

MCMAHON, J. **A Note on House Fly resistance to Residual Insecticides.** *East African Med. J.* 1957, Sept., v. 34, No. 9, 507–8.

"1. House flies were found to be resistant to dieldrin, gammexane and, to a lesser extent, D.D.T. in the Nandi Reserve and Kisumu Township.

"2. An increased resistance was observed against gammexane in areas previously treated with dieldrin only (but not against D.D.T.). It is presumed that this is a cross resistance.

"3. No marked resistance was observed against D.D.T. except in places where it had been used in the recent past."

"4. Resistance was observed in flies collected from areas which have not yet been treated with residual insecticides, and is more marked in dieldrin and gammexane than in D.D.T."

WIESMANN, R. Vergleichend histologische Untersuchungen an Normalsensiblen und gegen DDT-Substanz Resistenten stämmen von *Musca domestica* L. [**Comparative Histological Studies on Strains of House-Flies Susceptible and Resistant to DDT**] *J. Insect Physiol.* 1957, v. 1, No. 2, 187–97, 6 figs. on 5 pls. [13 refs.]

Experiments and histological examinations were made on 2 susceptible and 2 resistant strains of house-flies. Tarsi of the resistant strains required much longer soaking in fat solvent before they could be wet by water. On the other hand, after prolonged soaking in Diaphenol, the legs of resistant flies were more easily permeated by alkali. These tests are interpreted as confirming earlier investigations suggesting that resistant flies have more lipids in the epicuticle. Histological examinations revealed much more fat in the form of globules in the hypodermis of resistant flies. This lipid, and that in the epicuticle, is believed to block entry of DDT by absorbing it. Apart from this, the tarsal glands which secrete lipoid material (and enable flies to walk up smooth vertical surfaces) were much more developed in the susceptible fly strains. This is believed to increase pick-up and absorption of DDT.

[It is difficult to see how differences in lipid distribution could be responsible for specific resistance to DDT, though it may well concern tolerance to all contact insecticides which are soluble in lipids.]

J. R. Busvine

MIYAKE, S. S., KEARNS, C. W. & LIPKE, H. **Distribution of DDT-Dehydrochlorinase in Various Tissues of DDT-resistant House Flies.** *J. Econom. Entom.* 1957, June, v. 50, No. 3, 359–60. [10 refs.]

Two previous investigations have been made to discover the effective site of detoxification of DDT in resistant house-flies (STERNBURG and KEARNS, *Ann. Entom. Soc. of America*, 1950, v. 43, 444 [this *Bulletin*, 1952, v. 49, (562)], and TAHORI and HOSKINS, *J. Econom. Entom.*, 1953, v. 46, 302, 829). Both these papers indicate that the main site of degradation was in the cuticle-hypoderm, whether the DDT was applied to the flies topically, fed to them in milk, or mixed with the larval food medium. These deductions were made on the basis of quantities of DDE (the degradation product of DDT) found in various tissues at intervals after treatment.

The present paper approaches the matter in another way. The detoxifying enzyme "DDT-ase" was extracted from various fly tissues and made to act on DDT *in vitro*. The results showed much the highest activity by enzyme from the fat body and comparatively little in the

cuticle (except on a basis of soluble protein content). Fly brain tissue was also active and the authors suggest that lipid-rich tissue is most favourable for DDT degradation. They conclude that DDT is broken down by intracellular enzyme in nerve tissue, so that the resistant flies are prevented from developing any signs of poisoning due to nervous disturbances. *J. R. Busvine*

Ouye, M. T. & Knutson, H. **Reproductive Potential, Longevity, and Weight of House Flies following Treatments of Larvae with Malathion.** *J. Econom. Entom.* 1957, Aug., v. 50, No. 4, 490–93.

"Laboratory studies on certain aspects of the biology of a house fly strain, with no previous exposure to insecticides, were conducted to determine the effects of three successive treatments with malathion added to larval media at 2 p.p.m. to produce a mortality of 40 to 60%.

"Parent flies from larvae surviving malathion treatments produced 93% as many eggs as the untreated at the end of the 3 weeks. Longevity, based upon cumulative female-fly days, was 82% as great in these treated parents. The average number of eggs per female-fly day in the treated parents was 12% more than in the untreated parents.

"Eggs of the treated parents showed 2% less hatchability, but by the time that pupation was reached, the treated exceeded the untreated group by 2%, and by 1% after emergence. Survival rate between larval and pupal stage was 5% greater in the treated group; but 1% less than the untreated group between pupal and adult stages.

"The parent flies surviving malathion treatments produced 12% more potential adult progeny than the untreated. This resulted largely from differences during the first week of the treated parents' lives, at which time the treated greatly exceeded the untreated in number of eggs laid and in emergence rate of the resulting adult progeny.

"Adult progeny of the treated parents weighed less than those from the untreated parents."

Piras, L. & Loddo, B. Esperimenti di lotta antimosche in Comuni rurali. [**Studies on Fly Control in Rural Areas**] *Nuovi Ann. d'Igiene e Microbiol.* 1957, July–Aug., v. 8, No. 4, 329–37, 5 charts.

The English summary appended to the paper is as follows:—

"By carrying out fly-control experiments in some municipalities of Sardinia, in order to know the real effectiveness of some insecticides the Authors have drawn the conclusion that the most efficacious products are those containing phosphoric esters and DDT, and a DDT synergized preparation."

Knipling, E. F. & McDuffie, W. C. **Controlling Flies on Dairy Cattle and in Dairy Barns.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 4, 865–70.

DAVIES, L. **A Study of the Age of Females of** *Simulium ornatum* **Mg. (Diptera) attracted to Cattle.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 535–52, 6 figs. [16 refs.]

This study was made near Durham, England, during 1952–54. The methods of collection, laboratory maintenance and dissection of female blackflies are described. Field and laboratory observations are discussed.

The dissections showed the presence of large amounts of fat body in females of *Simulium ornatum* on emergence from the pupa and its reduction with increasing age. In these respects the species is similar to *S. damnosum* [this *Bulletin*, 1953, v. 50, 543] and others which have been studied, but this is the converse of the situation in male tsetse flies [*ibid.*, 1937, v. 34, 538].

In *S. ornatum* there is no evidence that fat body reserves are built up after depletion either from blood or from other ingested material. Unengorged females fed on sucrose solution showed depletion of fat body until little remained after 14 days. Females engorged on cattle became gravid in 4–5 days when virtually no fat body remained.

Of female flies taken on cattle those with visible fat body, of which 0·06% contained relict ripe eggs, corresponded to young flies which had not had a blood meal. Others, with no fat body, of which 16·5% contained relict ripe eggs, were old flies which had had a blood meal.

At certain times fresh blood occurred with greater relative frequency in the gut of old flies than in that of young flies, suggesting that old flies fed more readily or more quickly than young ones.

Of flies landing on an animal the proportion of old flies varied during the day and often increased towards evening when total landing activity increased. This increased activity broadly coincided with the less rigorous climatic conditions at that time of day.

Mortality rates between the young and the old fly stages cannot yet be calculated and the lengths of time during which a fly could be classed as young or old are unknown. The results suggest that either length of life is greater in September or that some seasonal change influences the reaction of flies of different ages to the cattle.

In the event of a disease being transmitted by the bite of *S. ornatum* a susceptible host would be exposed to a greater number of potentially infective bites in late evening than in the middle of the day and to a far greater number in early autumn than in mid-season. *H. S. Leeson*

VARGAS, L. & DÍAZ NÁJERA, A. Simúlidos de Durango y *Simulium* (*Simulium*) *marquezi* n.sp. (Diptera: Simuliidae). [*Simulium* **Species of Durango, Mexico, and** *Simulium* (*S.*) *marquezi*, **n.sp.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1957, Mar., v. 17, No. 1, 33–47, 43 figs. on 6 pls. English summary.

STARKOFF, O. Un caso di miasi delle vie urinarie da *Fannia canicularis* (L.). [**A Case of Urinary Myiasis due to** *Fannia canicularis*] *Nuovi Ann. d'Igiene e Microbiol.* 1957, July–Aug., v. 8, No. 4, 406–9, 1 fig. [11 refs.]

The English summary appended to the paper is as follows:—
"Myiasis of urinary tracts in man: report of a case due to *Fannia canicularis* (L.)."

PAMPIGLIONE, S. Le miasi oculari dell'uomo in Italia: revisione critica dei casi descritti. [**Critical Revision of Cases of Ocular Myiasis seen in Man in Italy**] *Nuovi Ann. d'Igiene e Microbiol.* 1957, July–Aug., v. 8, No. 4, 410–21, 8 figs. [29 refs.]

The English summary appended to the paper is as follows:—
"From a critical review of the human cases of ophthalmomyiasis that have been described in Italy the Author believes he may conclude that the genus *Oestrus* (*Oestrus ovis*) only seems to be considered as responsible for the external conjunctival forms, whereas the genus *Hypoderma* (*H. bovis*, or *H. lineatum*, or both) provokes the internal-anterior findings."

SKIERSKA, Barbara. Drugi na terenie Polski przypadek masowego zaatakowania ludzi przez kleszcze *Bdellonyssus bacoti* Hirst. [**Another Occurrence of Ticks** *Bdellonyssus bacoti* **Hirst in Masses attacking Man in Poland**] *Wiadomości Parazytologiczne.* Warsaw. 1957, v. 3, No. 5, 480.

BOCCACCI, M. & BETTINI, S. Contenuto in Coenzima A nella blatta (*Periplaneta americana* L.) e nella mosca domestica (*Musca domestica* L.) [**Coenzyme A Content in the Cockroach** *Periplaneta americana* **L. and in the House-Fly** *Musca domestica* **L.**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1957, v. 20, Pts. 7/8, 689–91. [10 refs.] English summary (5 lines).

BETTINI, S. & BOCCACCI, M. Effetto dell'acido iodoacetico sul contenuto di Coenzima A nel muscolo di blatta, *Periplaneta americana* L. [**The Effect of Iodoacetic Acid on the Coenzyme A Content in the Muscle of the Cockroach,** *Periplaneta americana* **L.**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1957, v. 20, Pts. 7/8, 692–4. English summary (8 lines).

British Standards Institution. **British Standard Recommended Common Names for Pesticides.** 31 pp. B.S. 1831: 1957. London: British Standards House, 2, Park Street, W.1. [7s. 6d.]

It is becoming more and more widely recognized that there is a real need for simple standard names for the complex organic chemicals used to control arthropod pests, fungi and weeds. In 1952, the British Standards Institution published a first list of proposed common names for pesticides [see this *Bulletin*, 1953, v. 50, 577]. It dealt with 13 insecticides, 5 fungicides and 7 herbicides. In 1953 a supplementary list came out with names for 6 additional compounds. Now there is a third and much more comprehensive list with no less than 41 insecticides, 9 fungicides, 13 herbicides and 5 rodenticides. As before, the full chemical names and structural formulae of the compounds are given.

[This question is now receiving consideration by a committee of the International Standards Organization. 2 meetings have already been held in Britain which, as the pioneer in this field, was invited to act as host country. Many of the names on the British list, which coincide with those used in U.S.A. and elsewhere, have been provisionally approved. It is to be hoped that they will soon be fixed as international standards.]

J. R. Busvine

Bami, H. L. **Analysis of DDT, BHC and Dieldrin Dispersible Powder for Suspensibility and Insecticide Content.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1957, May, v. 5, No. 3, 161–76.

Methods are described in detail, including specification of reagents and apparatus involved, for testing supplies of DDT, gamma BHC, and dieldrin dispersible powders for use in antimalarial and antifilarial programmes in India. The tests are reported as being rapid and simple, with precision adequate for assessing the quality of the supplies in terms of World Health Organization specifications.

D. S. Bertram

Miles, J. W. & Pearce, G. W. **Rapid Method for Measurement of Rate of Sorption of DDT by Mud Surfaces.** *Science.* 1957, July 26, v. 126, 169–70, 1 fig.

In many parts of the world, DDT residual spray has to be applied to mud walls. It is recognized that the decline in efficacy is very often due to adsorption of the DDT away from the surface, into pores in the interior of the mud. This has been demonstrated by bioassay and by chemical tests on fine scrapings from mud walls; but the former method is sometimes unreliable and the latter very time-consuming.

The authors describe a rapid laboratory method of measuring migration of DDT from the surface, a method suitable for testing additives intended to delay this process. It depends on the weak penetrating powers of soft

beta rays, the emission of which can be shielded by a very thin layer of dry mud. Radio-active DDT (0·48 mc./gm.) is intimately mixed with ordinary DDT, in the ratio 1 to 10 and the finely ground mixture is dusted very lightly onto prepared mud blocks (about 1 mgm. per block). The radio-activity of each block is determined at once (about 4,000 counts/min.) and at intervals subsequently.

Tests by this technique were made on treated mud blocks kept in a dry desiccator, at 47% and at 94% relative humidity (RH). It was found that detectable losses occurred within 24 hours. After 10 days, the dry block had lost about 50% radio-activity, while those in the moderate and humid desiccators had lost about 40% and 10% respectively. On moving the moderate and dry blocks into the 94% RH air, the loss of activity was halted or reversed. This was presumably due to desorption at high humidity.

Chemical tests, made on scrapings from the blocks, confirmed the greater migration of DDT from the surface in the blocks under drier conditions. *J. R. Busvine*

JOCHUM, F. **Changes in the Reaction Chains in the Insect Organism caused by Diethyl-p-Nitrophenyl Thiophosphate.** *Höfchen-Briefe.* 1956, v. 9, No. 6, 289–348, 6 graphs & 18 figs. [Numerous refs.]

Most of the toxicological work on organo-phosphorus insecticides has been of a biochemical nature and has concerned the effects of these compounds on acetylcholinesterase, *in vitro* and *in vivo*. This author has approached the problem by physiological and histological investigations with various insects and has come to the conclusion that the anti-esterase activity may not be the primary poisoning process. He observes that the insecticide parathion (Folidol-E605) causes excessive excretion of water by glands in the digestive tract of insects. This is the earliest important effect. The prolific excretion of water causes dehydration, with consequent loss of circulation of blood and changes in its solute concentration. The insect metabolism automatically rises in an attempt to restore the balance by metabolic water. This rise in metabolism (evident in gas exchange) precedes hyperactivity and is therefore not a result of it. The later stages of poisoning, characterized by hyperactivity and high acetylcholine content, are presumed to be due to abnormal blood and to higher body temperature due to raised metabolism.

The author suggests that the differences between mode of action of organo-phosphorus insecticides and compounds like DDT and BHC, may be less than generally imagined. *J. R. Busvine*

SOLOMON, M. E. **Estimation of Humidity with Cobalt Thiocyanate Papers and Permanent Colour Standards.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 489–506, 4 figs. on pl. [21 refs.]

BOOK REVIEWS

KERR, W. G. [M.B., F.R.C.S.] **Surgery. A Guide to Surgical Diagnosis and Treatment including Tropical Surgery.** pp. viii + 410. 1957. London: Oxford University Press, Amen House, Warwick Square, E.C.4. [25s.]

The author describes his book as a guide to surgical diagnosis and treatment. It is, in fact, rather more; it is a miniature text-book of surgery with particular emphasis on clinical diagnosis. By referring to it one can obtain reliable and up-to-date, although inevitably often sketchy, information on most topics. It is not a condensation of the standard larger books and it is obvious throughout that the author has put a great deal of himself into it, drawing on his many years of experience and observation in Africa. He says his book is primarily for medical assistants in the tropics; the admirable clarity of expression and the straightforward way everything is explained show that he has never lost sight of this object.

Having said this it is permissible to question whether it is a good standard text-book for a medical assistant. The answer depends on one's views on the training and proper role of this invaluable member of the medical service in all the underdeveloped countries. A widely held, and entirely tenable, view is that he should be a sub-standard doctor. If so, then this is his book and the best there is; the only major change one would like to see in a subsequent edition is a clearer distinction between what a medical assistant should be able to do and what he needs only to know about. This could well be done by the use of different sizes of type and would greatly increase the value of the book. The alternative view is that the medical assistant is a technician and that he should be trained in defined techniques which he should know thoroughly. This view in no way reduces his status; one of the most valuable members of the community is the expert technician. If this is what he should be, then this is not his book and the latter has still to be written. It will be a much more difficult book to write than this one and will require a different approach, based on prolonged study of the problems of defining the techniques and of teaching them.

The weakness of the sub-standard doctor approach is exemplified by the way the subject of breast tumours is dealt with in this book, which contains a description of the examination of the breast and axilla for possible cancer. The main points taught to medical students are included and should ensure that an obvious case is recognized. However, much of the detail which a medical student would be expected to know is omitted, detail on which the diagnosis, or the suspicion of it, so often rests. It is hard to see any justification for burdening a medical assistant's training and memory by half-teaching him the difficult subject of breast tumours. It is interesting that Mr. Kerr seems, by implication, to

concede this, for the section ends with a strict injunction that, unless the condition is obviously chronic mastitis, all lumps in the breast must be referred to a surgeon at once. This is, of course, the essence of the alternative approach, by which the problem of breast tumours is resolved into a technique of diagnosing chronic mastitis. If the result is positive the technician does one thing, if doubtful or negative he does the other.

The printing and production are excellent. There are no diagrams or illustrations to break the text; nevertheless it is a most readable book. The fact that his views on the training and role of a medical assistant evidently differ from those of the author did not detract from the pleasure and interest this reviewer derived from it. *H. J. Croot*

LAPAGE, Geoffrey. **Animals Parasitic in Man.** 320 pp., 67 text figs. & 14 figs. on 8 pls. 1957. Harmondsworth: Penguin Books Ltd., Middlesex. [5s.]

The book consists of a foreword, 12 chapters, a short list of works for further reading, and a reasonably adequate index. The foreword is contributed by Dr. CLARK-KENNEDY, who points out that civilization has driven away or destroyed many of the large destructive animals, such as tigers and snakes, but has proved less successful with the little animals, such as the arthropods, protozoa and bacteria. It is true that civilization has taught a minute proportion of the inhabitants of the tropics to protect themselves against these little animals, particularly against the disease-bearing arthropods, but it has not reduced their numbers, nor yet has it driven them away.

In the first chapter the author considers symbiosis and commensalism, which he distinguishes from parasitism as follows: in symbiosis both parties benefit; in commensalism if they do not benefit they at least do no harm to each other; in parasitism the parasite benefits to the detriment of the host, who always suffers injury, even though the injury may be only very slight. If we accept this definition, the next point that arises is the types of creature that can be classed under the title of parasite. The book assures us that certain arthropods, helminths and protozoa are parasitic animals; bacteria and viruses are parasites but are not animals, and large destructive creatures which kill their hosts are not parasites. This last definition is in accordance with that of Professor SWELLENGREBEL, who, when asked "Why is a tiger not a parasite?" replied that "A tiger is not a parasite because it has to kill its victim"; or, as ELTON neatly expresses it, "The difference between a carnivore and a parasite is simply the difference between living on capital and income".

The second chapter defines the 5 phyla of protozoa, annelida, nemathelminthes, platyhelminthes and arthropods, quoting examples of the parasites from each group that occur in man, and describing the nature

of the life cycles, direct or indirect, of some of them. Chapters III and IV are concerned with the "lone hands", a designation by which the author refers to parasites with direct life cycles, which are capable of parasitizing man without previous development in an intermediate host. As examples among the helminths he cites the hookworm, the roundworm, the thread worm, and *Trichinella spiralis*, the life cycles of which he describes, while from the parasitic protozoa he selects and describes *Entamoeba histolytica* and *Balantidium coli*. Chapters V and VI are concerned with animals that are twice parasitic in one life. As examples the author takes *Fasciolopsis buski*, the life cycle of which he briefly compares with those of the less important (so far as the human host is concerned) *Fasciola hepatica*, *Gastrodiscoides hominis* and *Echinostoma ilocanum*. In the same category are considered the life cycles of the schistosomes, the filarial worms, the guinea-worm and the "human tapeworms", *Echinococcus granulosus*, *Taenia saginata*, *T. solium* and *Hymenolepis*. In chapter VII he deals with the animals that are parasitic 3 or more times in one life, and gives an account of the life cycle of *Diphyllobothrium latum*, *Opisthorchis* [*Clonorchis*] *sinensis*, *O. felineus*, *Heterophyes heterophyes*, *Metagonimus yokogawai* and *Paragonimus westermani*. Chapter VIII is devoted to the malaria parasites; it includes a description of their life cycle in the human host and their effects on man, together with a brief account of the methods of control now commonly in use. Chapter IX deals with the trypanosomes which infect man, and describes their transmission by the tsetse fly and the reduviid bugs; it closes with a short description of the leishmaniae, *Giardia intestinalis* and *Trichomonas vaginalis*.

Chapter X, which is entitled *The skin as a Home or Source of Food*, is concerned with those parasites which live or feed on the skin surface of their hosts (here the word "parasite" includes blood-sucking bats, as well as helminths and arthropods). It begins with a fascinating account of the land- and water-leeches—a much neglected subject in medical publications—makes brief mention of the blood-sucking bats, and goes on to a description of myiasis and the various flies, ticks and mites which torment and carry disease to their human host.

In chapter XI the author discusses the effects of parasitism on the external morphology of the parasite, and the modifications that are likely to occur in the reproductive system and in the nature of the life cycle. Although this chapter deals only with the animals which attack men, the reader is warned that this is only one facet of a warfare that goes on throughout the whole world of living organisms, "And it is a war. Because no host, whether it be a plant or an animal, welcomes the parasite that invades it and seeks to get from it the food that it needs. The host reacts against these living invaders, just as it reacts against a splinter of wood or metal, a chemical substance or any other inanimate thing that gets into its tissues". Finally, chapter XII describes the various types of reaction produced in the host, and points out that, from

a knowledge of the life cycle and habits of the parasite and of the reactions which it produces, control measures can be devised.

The natural science graduate enters upon the study of medical and veterinary parasitology only after a long and careful preparation; the medical officer and the veterinary practitioner, on the other hand, although possessing much training in subjects denied to the science graduate, plunge into the highly intricate subject of parasitology with no sound training in the general principles of zoology and without any specialized knowledge of each other's subject. Dr. Lapage's book will do much to fill that gap. This does not mean that it can be regarded as a text-book on medical parasitology, and anyone who buys it with the idea of finding it a potted version of, say, BRUMPT's *Précis de Parasitologie* will be disappointed, and deservedly so. But the person who buys it as an introduction to a fascinating subject will read it with profit and pleasure, and he may discharge his debt to the author by passing on his copy to a friend (we suggest a first-year medical student) and then by going out and buying another copy for himself, which, at a cost of only five shillings, is in these days of expensive text-books, a wonderful bargain.

The foreword mentions various types of person to whom the book should appeal; the reviewer can shorten the list considerably by saying that it will appeal to every intelligent person interested in natural history.

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